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WRITTEN SO YOU CAN UNDERSTAND IT

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Optical Device Helps Women Choose Gowns

TO assist women in choosing becoming effects when selecting designs for their suits and gowns, a stereopticon apparatus has been developed in the East for displaying patterns. The function of this is to enable a modiste to show a patron exactly how a costume of a certain type will look upon her when made. It largely eliminates guesswork and re-

The Picture of a Costume Cast upon the Screen by the Projector is Clearly Outlined in the Mirror Immediately below the Reflected Image of the Woman's Head, so That It Appears to Clothe Her Own Figure

lieves a woman of overburdening her imagination by attempting to picture herself in a new creation.

At one end of an unilluminated room with black, nonreflecting walls, a full-length mirror is provided. Some distance in front of this is a screen which may be adjusted to various heights. A stereopticon is mounted in a booth at one side so as to throw images upon the screen. Any picture shown upon the latter is reflected in the mirror.

In making use of the contrivance the patron stands behind the screen, the top of which is level with her chin. A picture of a gown is then projected in such a way that the mirror reflection gives a composite image of the woman's head upon a body robed in that style of costume. Gowns of different designs may be shown in this manner one after another. A shaded lamp immediately above the screen casts its rays directly upon the patron's head, so that that part of her body is clearly defined in the mirror. At one side a permanently focused camera is provided to enable photographs to be made of the images shown in the mirror in order that a patron may study them carefully at her leisure before having any of them made for her.

MULTIPLE-DISK PHONOGRAPH INCREASES SOUND VOLUME

Playing two or more phonographs at a time as a means for increasing sound volume has often been tried, but generally with poor success. Only a slight difference in the speeds or timing of the two disks results in throwing the melody into a jarring discord, for one record soon plays far ahead of the other.

By Playing Disks in Multiple, New Phonograph Produces Great Volume of Sound; a Common Axis Keeps the Disks in Unison

To obviate these difficulties, and still secure the larger volume of sound resulting from the use of two or more records at the same time, a Paris inventor has devised a phonograph of a type different from the ordinary kind. All the records are attached to one vertical driving axis, and because of this mechanical connection, must necessarily remain in unison throughout the playing of any given piece. Each disk is provided with its own needle and reproducer. All the sound goes into a common horn by means of suitable connecting arms properly pivoted at the large ends. In addition to greater volume, harmony effects may also be secured. This is done by using disks which individually play soprano, alto, bass parts, etc., the whole blending into one melody when run together on the machine.

LUMBER-PILING APPARATUS ALSO FIRE TOWER

Through the utilization of a power-driven piling machine of recent development, lumber stacks in some of the big yards in different cities are being carried to heights as great as 42 ft. The appearance of these yards is very striking, but the significant feature is represented in the economic phase of the change which is taking place. The stacking machine is cutting the cost of piling and unpiling lumber, econo-

The Lumber-Piling Machine in an Emergency Serves Quite Efficiently as a Fire-Fighting Equipment. A Monitor Nozzle Provided at the Top of the Structure Enables a Heavy Stream of Water to be Thrown in Any Direction from a Position Several Feet above the Stacks of Lumber

mizing space, lessening the cost of roofing lumber and pile bases, and also lowering labor costs.

It consists of a steel tower, mounted on a truck, over which two endless chains, equipped with arms at intervals of 42 in., revolve. A 5-hp. motor mounted on the platform of the carrier drives the conveyor 38 ft. a minute. This speed is sufficient to hoist one plank, or two if two boards are placed on each arm, every six seconds. Four men, two on the ground and two on a stack, work with the machine. In a 10-hour period 125,000 ft. of lumber were piled in one yard where the apparatus is being used.

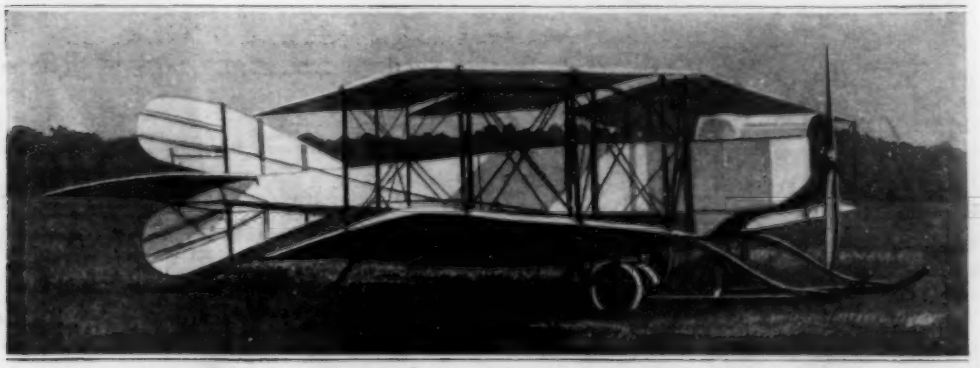
The machine will handle boards of any width not greater than 18 in., nor thicker than 4 in., and in lengths from 8 to 24 ft. It may be moved from one stack to another readily and will unpile a stack just as rapidly as it builds it. In addition to its other functions, the apparatus furnishes an effective fire-fighting equipment. At the upper end of a large pipe extending to the top of the stacker a monitor nozzle is mounted. In case of fire breaking out in a yard, a fire hose may be connected at the lower end of the pipe. The machine then becomes a fire-fighting tower from which a blaze may be combated. Since the monitor nozzle can be turned in any direction and the apparatus moved from one point to another, it is a valuable protection for a yard.

POWERFUL BATTLE PLANES DESIGNED FOR ALLIES

According to the claims of a Washington, D. C., air-craft company, a fleet of battle aeroplanes of an exceedingly formidable type is being built at the national capital for the use of the allied aeronautical forces. Twenty-one machines, each having a wing spread of 180 ft. and an over-all length of 104 ft., are understood to be in course of construction. All are to be heavily armored biplanes driven by dual engines developing 1,700 hp., which will give an estimated maximum speed of 90 miles an hour. The armament of each will also be heavier than usual and is to consist of four machine and two rapid-fire guns, and a pair of bomb-launching tubes.

The model represents the largest heavier-than-air flier so far developed in America. When ready for action its weight will amount to 30,000 or 35,000 lb. The fore and aft cockpits are designed to accommodate a complement of eight men, two of whom will serve as pilots. It will be possible to carry a store of fuel sufficient to keep the cruiser in the air from 7 to 14 hours.

Because of the function it is to play, great care has been taken in designing it to make it as nearly invulnerable as possible. Its two pilots are provided



Some of the General Structural Features of the Big Battle Planes will be Similar to Those Represented in This Small Machine Which Is a Product of the Washington Plant

separate compartments in which are dual sets of manual controls. In addition to these, there is an automatic-control system. This gives the craft five separate means of operation, any one of which might be employed to return it to its base were the other four crippled by shells. The plans provide for the installation of a rapid-fire gun of large caliber at the front of the forward cockpit. Immediately aft of this two machine guns will be mounted, one on the starboard and the other on the port side. Back of the propellers and in the after cockpit another pair of machine guns will be similarly mounted, and at the rear a second rapid-fire gun.

The gun equipment is intended principally for defensive purposes. Bombs of remarkable size will be employed for offensive operations. These are 5½ ft. in length, have a diameter of 14 in., and are filled with 200 lb. of high explosive. Some 25 or 30 projectiles of this kind will be carried in racks arranged on either side of the launching tubes. The two engines comprising the cruiser's power plant will operate independently of each other and drive two 20-ft. propellers of the triple-blade type at a speed of about 600 revolutions a minute. In addition to the armament and military equipment, the cruiser will carry two outfits of radio apparatus and dual sets of instruments, such as clocks, barometers, inclinometers, horizontal and vertical ascent and descent indicators, and drift gauges. Tables and sketching paraphernalia will be at the command of the observers.

If all the claims made for the battle planes are correct, they will be superior in size to any aeroplane ever constructed, so far as is known. The latest cruiser developed by the French is reported to have a wing spread of 130 ft. The world-famed machine built by the Russian designer Sikorsky has a span of only 88 ft. and weighs 6,600 lb., as compared with the accredited 30,000 lb. of the new American craft which, so far as is known, has not as yet been tried out.

SHOW-WINDOW TELEPHONE SECURES MANY ORDERS

To secure a better hold on passers-by who display a casual interest in the window displays, an eastern store has

Store Uses Clerk and Telephone to Communicate with Persons Displaying an Interest in the Show Window

hit upon an unusual plan which is at present being tried out. The goods are displayed in the window in the usual manner, and at one side sits a clerk at a desk. Outside on the walk, at the edge of the window frame, a telephone is installed, which communicates directly with the clerk. Any information the passer-by may want on the goods displayed is cheerfully furnished, and his order booked if he so desires. Thus far the scheme has been voted a decided success, not only because of its novelty and the discussion resulting, but from the orders received and the many valuable names added to the firm's mailing list as well.

¶A touring car is offered to its employes by an automobile company for the most valuable suggestion to the company made during a period of six months.

BICYCLE RIDER BALANCES DINNER ON HIS HEAD

A bicycle rider who is skilled both as a rider and as a balancing artist was recently employed to advertise a restaurant in a western city by riding through the business streets dressed as a French chef and balancing on his head a large tray loaded with a full-course dinner. On the rear of the bicycle were large placards calling attention to the location and service of the restaurant. The unusual spectacle aroused a great deal of comment.

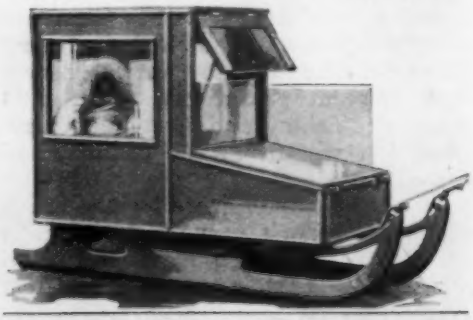
A Restaurant in a Western City Used This Means of Attracting Patrons

TRAINS CRASH WHEN STRAY CURRENT WORKS SIGNAL

A fatal collision occurred recently on a southern railway when a stray electric current operated a signal relay and as a consequence two trains crashed into each other. The train movement in the territory in which the wreck occurred is made under the controlled manual block system. Signals cannot be given opposing trains without the coöperation of the operators at either end of the block. The railway's report declares that the signal to the south-bound freight was not given by the operator but was caused by current from some outside source picking up the signal relay. The signal wires of the railway and the telegraph company's wires are on the same poles, the signal wires being beneath the others. Since workmen for the telegraph company are said to have been working in the vicinity on the day of the accident, it is thought that their work may have been responsible for the stray current. Fifteen persons were killed in the wreck.

CHILD'S SLED EQUIPPED WITH LIMOUSINE BODY

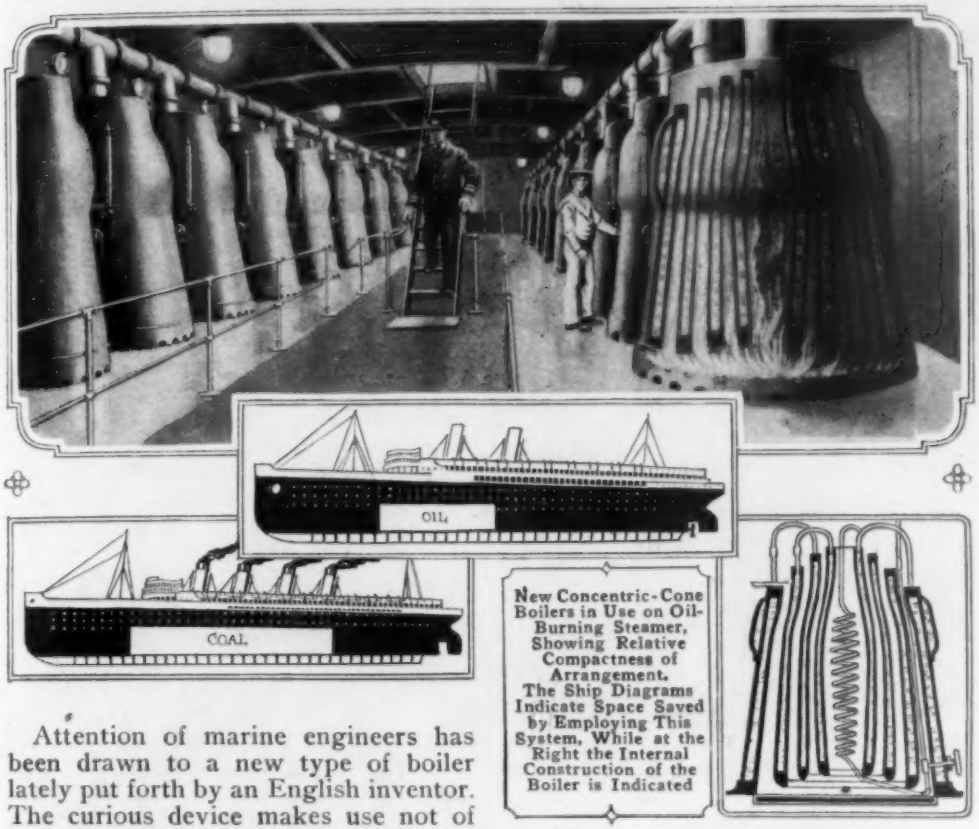
A child's sled with an inclosed body resembling a limousine body has been constructed by a New York parent. With it small children can be taken for sled rides without exposing them directly to the rigors of winter. There is plenty of room for the little occupant of such a convenience to sit up, or lie down full length. Windows are fitted to all four sides of the inclosure, the front one being divided and fitted with a brace so that it can be opened in the same manner as a windshield.



Sled Which Affords Ample Protection against the Cold

¶ The government has opened a branch passport office in New York.

NEW OIL-FUEL BOILER OF GREAT EFFICIENCY



New Concentric-Cone Boilers in Use on Oil-Burning Steamer, Showing Relative Compactness of Arrangement. The Ship Diagrams Indicate Space Saved by Employing This System, While at the Right the Internal Construction of the Boiler is Indicated

Attention of marine engineers has been drawn to a new type of boiler lately put forth by an English inventor. The curious device makes use not of flues nor of coils of pipe to secure quick steaming, but of hollow concentric cones. According to tests made, a boiler of this type, the size of a hogshead, will generate as much steam and has as high a horsepower rating as the ordinary variety of boiler many times larger. This compactness and high rating make the boiler particularly adapted to marine service, where space is valuable, besides which its ease, and comparative cleanliness, of operation result in a quite substantial saving of labor.

The new generator has a rated evaporation of 17 lb. of water per pound of paraffin oil used as fuel. In one test 100 lb. of steam was raised from the cold in 12 minutes, using a paraffin flame; and occasionally the feat has been accomplished in even half that time. The quick-steaming qualities are a natural result of the boiler's peculiar form. Being constituted of one hollow cone within another, each of which contains its quota of water, heat from the monster burner beneath reaches all parts of the liquid almost at once. Each cone is cut off at the top, allowing the heated gases to slip up between the broad surfaces and out at the upper end almost without diminishing of draft. Within the center cone is a coil of pipe forming the superheater. Steam circulates from one section to the next through connecting pipes at the top.

¶Washington authorities have condemned the practice of increasing the size of oysters by allowing them to "drink" quantities of fresh water, as adulteration.

OLD WOODEN DAM STILL IN USE

In striking contrast to modern concrete dams is a simple wooden structure, still in use, built 40 years ago in

This Wooden Dam was Built 40 Years Ago for Hydraulic Mining but Now Furnishes Water for Irrigating and Domestic Purposes

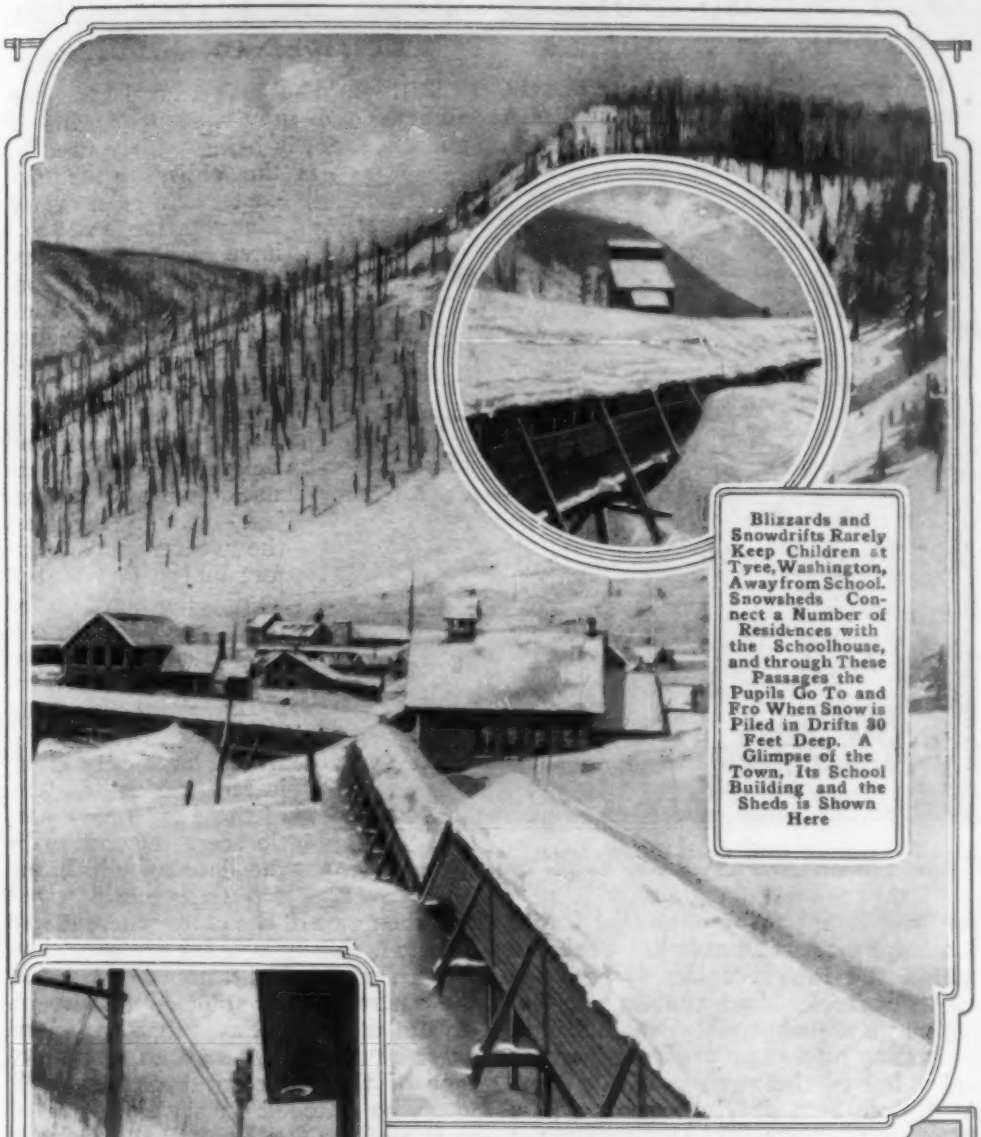
a mountainous region of California at an elevation of 6,000 ft. In appearance it resembles a high, tight board fence, slanting downstream; it is supported by rows of heavy wooden props. The dam is 550 ft. long and 21 ft. high. The water stored by it fills a reservoir of 90 acres and was originally used for hydraulic mining. Now it furnishes water for domestic and irrigation purposes. Of many dams of this type built in the early days, this is said to be the only one remaining in this region.

COMMUNITIES COOPERATE WITH FOREST SERVICE

During the past year $400,000 was spent by the United States Forest Service in the construction and maintenance of improvements in the national forests. This does not include the contribution of the time of the forest officers, which, however, was less than in former years on account of the severity of the forest fires. The service makes a special effort to enlist the interest and coöperation of communities whose welfare is vitally affected by the care and control of the national forests. In the work accomplished in the past year a considerable percentage was furthered by community and individual aid. The projects completed during the twelvemonth comprise 108 miles of road, 1,719 miles of trails, 2,287 miles of telephone lines, 166 miles of fire lines, 102 lookout structures, 35 bridges, 267 miles of fence, 23 corrals, 202 water improvements, etc. Severe fires and winter storms have made the upkeep of improvements a heavy expense and the amount of new work possible has been proportionately less.

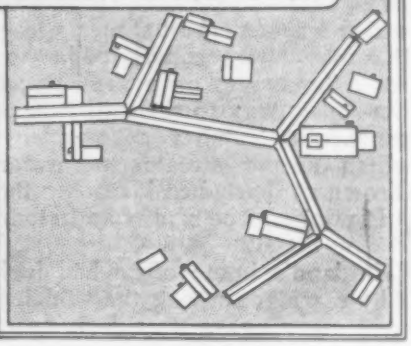
VILLAGE SCHOOL AND HOMES CONNECTED BY TUNNELS

At Tyee, a small railroad point in northwestern Washington which is usually almost buried during the winter, snowsheds connect a small frame school building with the few houses in which there are children of school age. Through these wooden tunnels the children make their way to and from school in comfort, while blizzards sweep across the snow banks above them. The sheds are made necessary by the character of the hilly village which has no street other than a railroad right of way. When snow is drifted so that it is from 20 to 30 ft. deep in many places, and big rotary snowplows have cleared the railway, leaving high embankments of snow on either side, track walking is dangerous and all communication difficult. Because of this the citizens have constructed the snowsheds through which the children, nine in number, pass. These tunnels beneath the snow also provide the people a ready means of access from one house to another when they are snowbound.



Blizzards and Snowdrifts Rarely Keep Children at Tyee, Washington, Away from School. Snowsheds Connect a Number of Residences with the Schoolhouse, and through These Passages the Pupils Go To and Fro When Snow is Piled in Drifts 30 Feet Deep. A Glimpse of the Town, Its School Building and the Sheds is Shown Here

The Entrance of One of the Sheds is to be Seen at the Left, While at the Right the General Plan of the System is Presented. When the Village is Snowbound the Wooden Tunnels Permit Ready Communication between the Various Houses Connected with Them



STONES WASHED FROM LOGS TO PREVENT ACCIDENTS

When a swiftly revolving buzz saw, tearing its way into a log, strikes a stone, or other hard foreign substance, the saw is apt to be shattered into a thousand pieces and may kill workmen within the range of the flying fragments of steel. Much timber, after being cut, is rolled or slid down hillsides, hence not infrequently stones become imbedded in the surface of the logs. A shower bath for logs about to be taken into a sawmill has been designed which washes off all stones and gravel that may have accumulated in the bark. As a log moves on a mechanical carrier on its way to the mill it is passed beneath a number of nozzles from which strong streams of water are thrown so that when it reaches the saw it is washed free of dirt and stones.

Logs are Given a Shower Bath to Dislodge Stones That might be Imbedded in the Bark and Hence might Shatter the Saw When It Strikes Them

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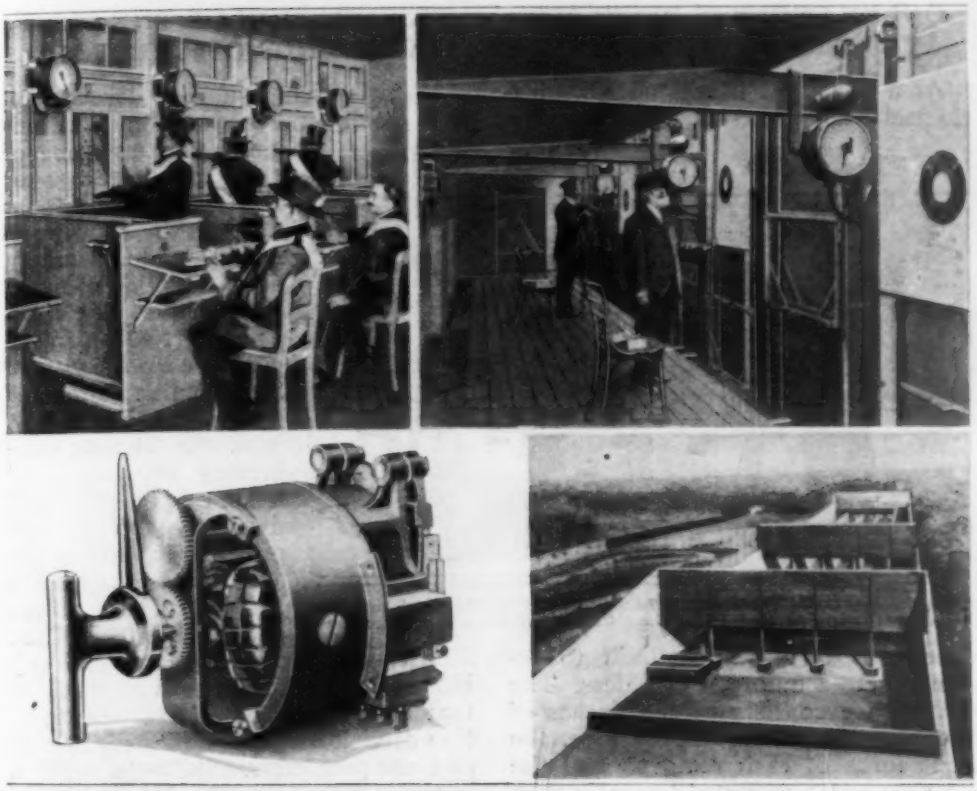
¶ England's home office has included baby carriages among the vehicles that must carry lights after dark.

DATES OF BATTLE SCARS TATTOOED ON SOLDIERS

Tattooing, because it furnishes a permanent and unmistakable means of identification, is being widely used by the soldiers in the present European war. Many tattoo artists have made large sums of money since the conflict began, one claiming to have imbedded in the flesh of departing soldiers practically every regimental crest of the British, French, and Belgian armies. These marks will, of course, last through life, and the wearer finds comfort in the fact that if he dies unknown on the battle field his body can be more easily identified.

But there are many other uses of tattooing which have sprung up in recent months. One of these is to have battle scars tattooed with the date on which the wound was received and the name of the place where it was inflicted. Many a young woman, newly married, has had tattooed on her arm the portrait of her soldier-husband. A skillful tattooist relates that one woman came to him and insisted that a picture of the cathedral at Ypres, Belgium, be tattooed on her skin. In the course of the five one-hour sittings required to comply with the request, it was learned that the woman had lived in Ypres, and in the cathedral she had spent many consoling hours. Hence its ruin seemed to her a personal loss.

Not infrequently soldiers come to tattooists with the request that such a name as "Mary" on the arm be changed to "Bessie." The only way this can be done is to cover the word "Mary" with some design, such as a floral pattern, and tattoo the new name below.



The Receiving and Transmitting Indicators at the Firing Point and Butts are Shown Above, While Below, the Adjusting Mechanism of the Instrument and a Glimpse of the Range are Pictured

ELECTRIC INDICATORS USED ON GERMAN RIFLE RANGE

Satisfactory results have apparently attended the use of electric indicators installed shortly before the war at the ranges of a rifle club at Spandau, near Berlin, for the purpose of signaling from the butts to the firing points the value of each shot. Separate apparatus is used on each range, and consists principally of two indicators, one acting as a transmitter and the other as a receiver. The dials of each are numbered from 0 to 20 and inscribed with the words "telephone" and "stop." The pointers of both instruments may be moved simultaneously by turning a handle, provided with the transmitter, which is connected with an adjusting device that resembles a small motor and is mounted within the housing. After a marksman has fired a shot he presses a button to signal the target man who then reads the score and adjusts the index of the transmitter to correspond with the ring number hit by the bullet. This adjusts the pointer on the receiving dial to read the same as the transmitter. A telephone is also included with the system, and when the operator at the target wishes to communicate with the marksman he turns the pointer on the transmitter to "telephone." This informs the latter of the call. The use of the indicator system has greatly increased the capacity of the ranges by cutting the otherwise necessary delay between successive shots.

¶A shed in which cars of coal may be placed when the weather is cold, and thawed out before being run onto the dumping machines, is to be built by an eastern railroad.

QUEER CYCLE IS DESIGNED TO CARRY FIVE RIDERS

As a novelty a Cleveland, O., bicycle dealer has constructed a heptacycle,

Seven-Wheeled Cycle Constructed to Accommodate Five Riders: The Queer Conveyance was Designed to be Used Chiefly for Advertising Purposes

a seven-wheeled vehicle built to accommodate a quintette of riders. The conveyance consists of the frames of five bicycles joined side by side, the front forks of each removed and the steering posts mounted securely in a steel bar extending along the front. At either end of this is a wheel supporting the front part of the cycle. These are guided by a steering gear arranged similarly to that of a motor car. Each rider assists in the propulsion of the machine, while the steering devolves upon one person. The machine was used in the city some time ago for advertising purposes.

The frames are so hinged together at the rear that the back wheel of each is free to pass over bumps, or drop into depressions encountered in a road, without affecting the others or damaging the machine. The steering rod connecting the front forks is placed immediately beneath the supporting bar, so as not to lock when a corner is turned. When ridden at a speed of eight or ten miles an hour the cycle is easily managed. Because of its scant wheelbase, however, it cannot be operated at a much greater speed with safety.

RESTORATION OF THE CLIFF DWELLINGS OF COLORADO

Work which is now under way on the repair and restoration of Community House, one of the cliff dwellings of the Mesa Verde National Park in southwestern Colorado, is simply a continuation of much work of the same character carried on in recent years by the Smithsonian Bureau of American Ethnology, with the idea of preserving the ruined homes of the cliff dwellers, who are supposed to have been the ancestors of the Pueblo Indians. Three of the ruins, Spruce Tree House, Cliff Palace, and Balcony House, have already been repaired so that they are available for the inspection of visitors. Some idea of the size of these prehistoric dwellings is given in the fact that the Cliff Palace almost entirely fills a cave having a 300-ft. frontage, and contains more than 200 rooms.

MINER USES GRAVESTONES TO MARK NEW CLAIM

Tombstones taken from a near-by cemetery were used by a mining prospector recently to mark the location of a valuable strike to which he lays claim. The rich find is of tungsten ore and is located in Mineral County, Nevada. In this region boulders are scarce and consequently the enthusiastic miner purloined several gravestones to use as location monuments. News of the discovery of ore spread rapidly and there was a rush of miners to the neighborhood.

¶An efficient method employed in advertising German cities consists of a brief description of the city printed on the back of a regular mailing envelope.

IMMORTALIZING CHICAGO'S MIDWAY

By ROBERT H. MOULTON

THE Midway transformed—or the metamorphosis of the freak avenue of World's Fair year into the most artistic formal boulevard in the world—is a change which a great many persons are destined to see, provided they were democratic enough to visit the "plaisance" during Chicago's great exposition of 1893, and provided, also, that they live long enough to see Lorado Taft's plan for beautifying the Midway carried to completion. Rapid strides have been made in the work since the plan received official sanction two years ago. But it is a plan so huge that years yet will be required to carry it out. The subject, indeed, is so big and relates to the ornamentation of a territory so large that additions can be made almost indefinitely for generations without decreasing the value of the work done in the early stages. In result the project will carry into permanent effect a mile-long vista of water, lawn, trees, and sculpture, such as has never been approached except in the temporary structures of the World's Fair.

At present the Midway is a grassy strip a mile in length, and about 1,000 feet wide, connecting Washington and Jackson parks. It has always been the intention of the South Park authorities to extend the depression of the Midway from the lagoons of Jackson Park to the small lakes of Washington Park, thus forming a waterway from park to park. Mr. Taft's plan presupposes this straight and formal canal, which is to occupy the present depressions at a lower level than the street.

The Midway Plaisance was thus christened at the time of the World's Fair. On either side it was flanked by the booths of the fakers. It was the favorite promenade of sight-seers. It now adjoins the campus of the University of Chicago, and the proposed scheme will be an appropriate setting for this seat of learning, which possesses some of the most beautiful buildings in America.

The canal bisecting the Midway will fill the present central depression and will be about 100 feet wide. It will be spanned by three bridges of monumental design, to be dedicated to the three great ideals of the race and to be called "The Bridge of Sciences," "The Bridge of Arts," and "The Bridge of Religions," an adaptation of the "Pont des Arts" in Paris. Along the higher strip of land, some distance back of the canal, and on either side, will stand the statues of the world's greatest idealists. Then at the two ends of the Midway will be the great fountains—that of "Time" being at the west end, and that of "Creation" at the east end.

"The Fountain of Time" for the west end was suggested to Mr. Taft by Austin Dobson's lines:

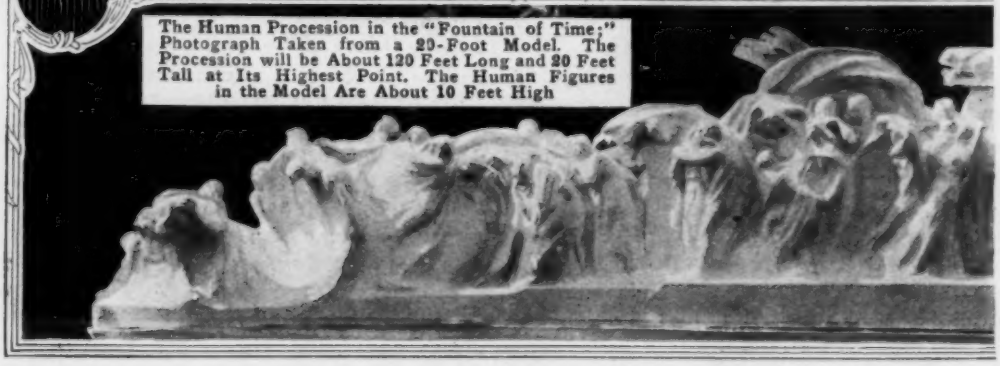
"Time goes, you say? Ah, no.
Alas, time stays; we go."

It will show the human procession passing in review before the great immovable figure of Time. Father Time will be represented by a rugged, crag-like figure, reviewing a throng of hurrying people; the long processional group will show these people indistinct, but all hurrying and crowding toward a goal they cannot see. A warrior on horseback, flanked by banners and dancing figures, will form the center of the composition, which will fade off at the ends into creeping infancy, or the bent and withered figures of age. The procession will seem to rise from a great jet of water on one side and sink from sight at the other, Time meanwhile standing firm and immovable. There is a suggestion of joyous onward movement in this procession and of the splendor and pageantry which life has achieved since that first day of creation, which the other fountain, "Creation," planned for the opposite end of the Midway, will celebrate.

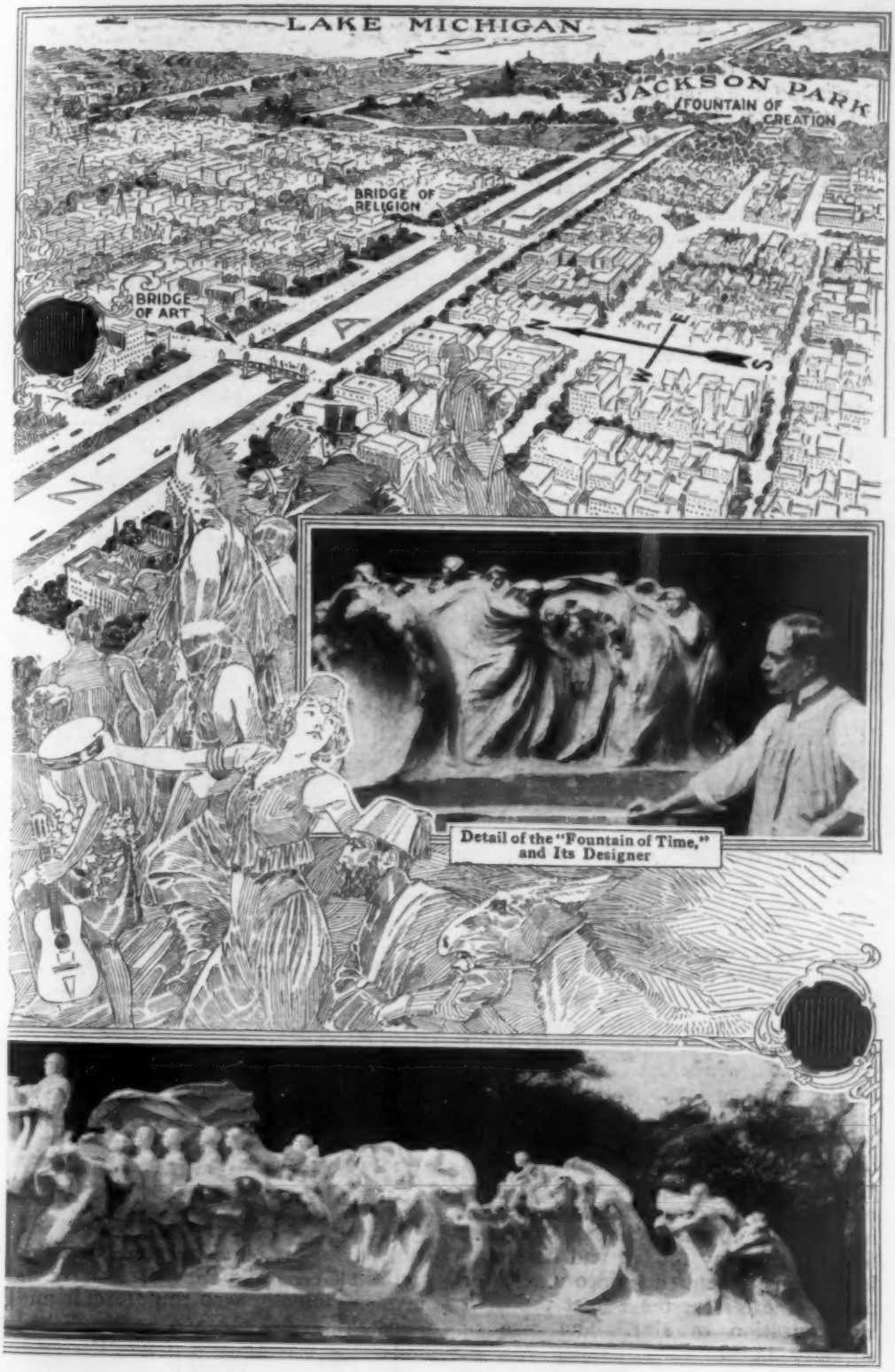
"The Fountain of Creation" will receive the waters of the canal at a point just west of Jackson Park. It is

Model of the "Fountain of Creation"

The Old Midway of the Chicago World's Fair will be Replaced by a Formal Canal Connecting Jackson and Washington Parks. Artistic Bridges will Span Its Waters, and Fountains and Statuary will Grace Its Banks



The Human Procession in the "Fountain of Time:" Photograph Taken from a 20-Foot Model. The Procession will be About 120 Feet Long and 20 Feet Tall at Its Highest Point. The Human Figures in the Model Are About 10 Feet High



Detail of the "Fountain of Time," and Its Designer

founded on the myth of Deucalion. Deucalion, the Noah of Greek legendry, and his wife, Pyrrha, being the only mortals saved by Zeus after the nine days' flood, stepped out from their frail boat to the top of Mount Parnassus and consulted a convenient oracle as to the best way of restoring the human race. The goddess told them to cover their heads and throw the bones of their mother behind them, and Pyrrha divined that these bones were the stones of Mother Earth. Mr. Taft will show us the moment when these stones, cast by the titan's hand, are changing into men and women, rising out of the clod and flood and fog into life and light. The composition will begin with creatures half formed, vague, prostrate, blindly emerging from the shapeless rock; continuing at a higher level with figures fully developed and almost erect, but still groping in darkness, struggling, wondering; and will reach its climax, with a statue group, at the summit, of beings complete and glorious, saluting the dawn.

"The Fountain of Time," on which Mr. Taft and a happy company of sculptors are now at work, is composed of 89 separate figures, and even the models for these figures are in various stages of incompletion. The visitor to the Taft studio finds them scattered about in the high-ceilinged, glass-roofed rooms, many of them at the present time looking like little more than hulks of meaningless clay, although others have passed out of this fœtus stage into figures which have begun to suggest the motive that was back of the mind that originated the scheme as a whole.

The average layman—even he who may profess a certain appreciation of sculpture—hardly realizes the amount of labor involved in the making of statuary. In addition to the two chief processes through which it is necessary for all work to pass—the construction, first, of the clay model, and its transformation subsequently into marble or metal—there is at the outset the difficult question of size. The size of statuary is not only a keen test of artistic judgment under all circumstances, but it is something that must be determined by the environments which the work will have when in place. It has taken costly experience to impress the importance of this feature upon sculptors. When St. Gaudens, for example, made the statue of Diana (the one seen in the Agricultural Building at the World's Fair) for Madison Square Garden at New York, he made it too large—an error that might have been obviated, as he afterward saw, had he taken a model to the park and studied it in relation to the home it was expected to occupy when completed. Mr. Taft estimates that he has spent $5,000 on these models, which are taken out on the Midway and studied there.

However much of Mr. Taft's general scheme is adopted eventually by Chicago, it is likely to make a Midway that will suggest some strange contrasts to those who saw the Midway of 1893. The home of all the side shows of the big Columbian exposition was an interesting place, but it was not exactly artistic. The streets of Cairo and the Ferris wheel and the Moorish palace drew a vastly greater number of persons, nevertheless, during those summer days of '93 than did the art exhibit in the present Field museum. Perhaps it is only in accordance with the law of compensation, then, that chaste Greek goddesses are to adorn the paths where once there strolled the naughty "nautch" girls; that classic orators will stand on pedestals once occupied by the loud barkers of Dahomey village, and the music of $250,000 fountains will be heard in place of the tomtoms of the South Sea islanders.

HOMESTEAD MOVED TWENTY MILES PIECE BY PIECE

Taking down an old house and transporting it piece by piece 20 miles and then reconstructing it exactly as it was originally was the difficult and painstaking task recently accomplished under the direction of a wealthy resi-

dent of Cleveland. The home which has been moved in this novel manner is one which, for sentimental reasons, the owner desired to preserve after he inherited it from his aged mother, who died recently. Since her estate had to be settled, the most feasible way of preserving the old homestead seemed to be the one indicated. The structure was constructed 65 years ago on what is now Euclid Avenue, Cleveland, and was the boyhood home of the present owner, who purchased a 60-acre tract near Cleveland upon which to rebuild it.

In taking down the house great care was exercised not to destroy any portion of it. Likewise the relative locations of the various pieces of wood and other material were carefully noted.

Not only has the house been rebuilt exactly as it was originally, but the furnishings have been transferred and placed in the identical positions that they occupied when the mother was alive. The present owner sent east and secured wall paper of patterns which matched perfectly that used in several rooms. In some instances paper was made especially for this house in order to reproduce every detail.

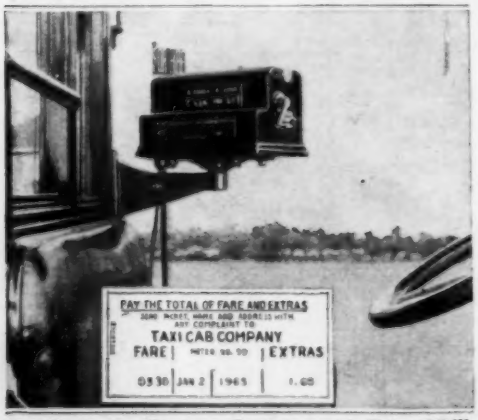
The chairs were reupholstered in horsehair; the blunt-edged screws in the big door hinges have been put back

The Old Cleveland Homestead in Its Original and New Location, and Views Showing Old-Fashioned Interiors: It was Carefully Torn Down, Carried 20 Miles on Motor Trucks, and Rebuilt and Refurnished Exactly as It Was Originally

in place; at either side of the front door have been preserved the long narrow windows through which, in ante-bellum days, many a fugitive slave anxiously peered while in hiding; quaint vases, candlesticks, book racks, mahogany tables and chairs once more stand as their former owner left them, all as a result of the almost mathematical accuracy with which the reconstruction and refurnishing of the house were accomplished. In the dining-room floor is a border pattern of dark and light woods. When the workmen began to polish this floor after re-laying it they were surprised to find that the dark pieces were mahogany instead of walnut. That indicates something of the quality of the materials used in the building, which doubtless will stand for many years in its new location.

TAXIMETER GIVES CUSTOMER PRINTED FARE RECEIPT

Arguments between cab drivers and their customers over fares charged are to be done away with by using a con-

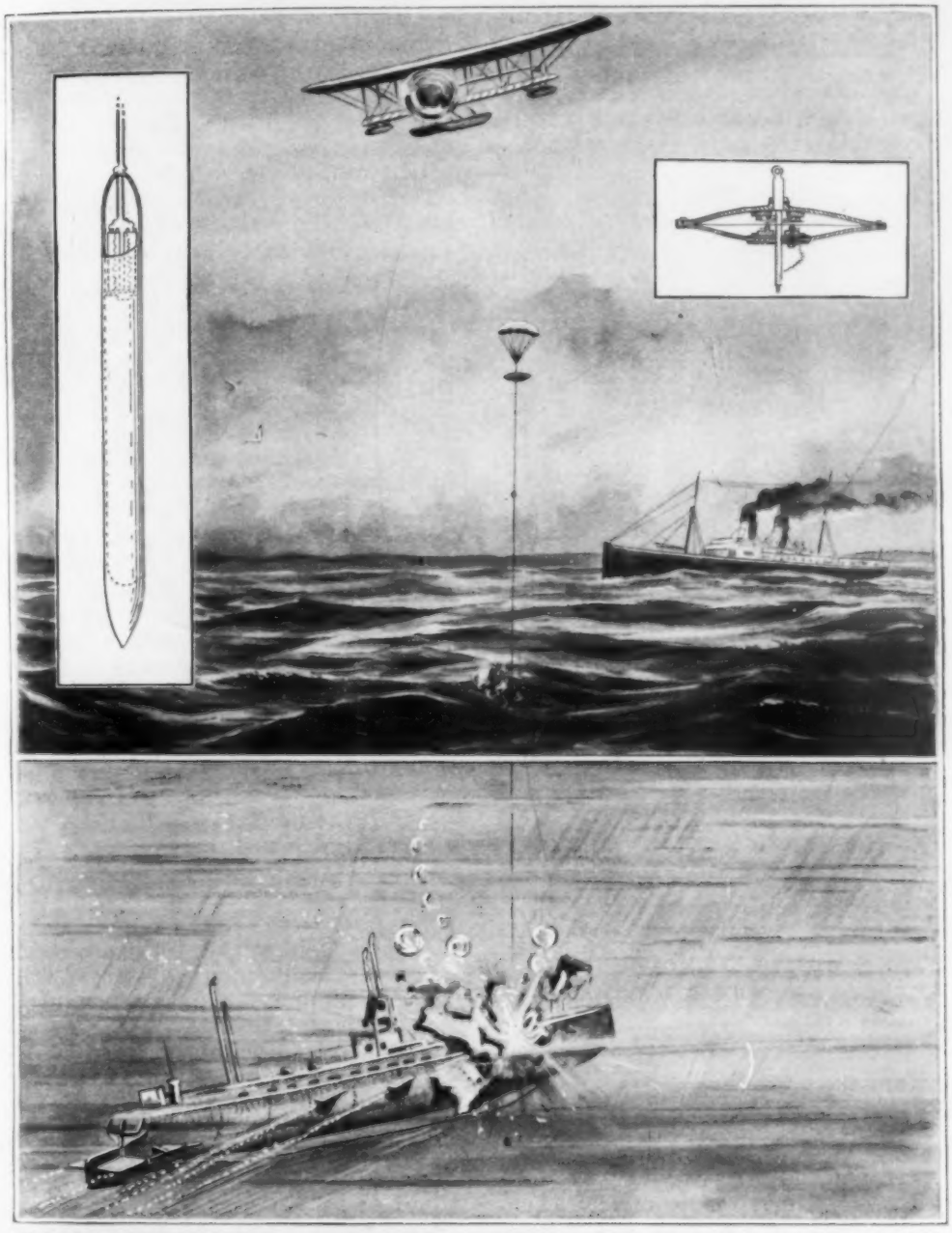


New Taximeter Presents Customer with Printed Bill at the End of a Trip. The Record Kept Prevents Mistakes and Unfairness on the Part of the Driver

trivance recently devised and now being tried out in an eastern city. Its special feature is that a printed slip is automatically delivered to the customer at the end of a trip. On the slip is given the straight fare, any extras that may be due, the meter number, and the date. A duplicate record is kept inside the machine for the company's benefit. This latter is even more complete than the former, and gives among other things the distance in miles traveled while the taxicab was hired; total distance covered by the cab whether hired or not; non-revenue-earning time in minutes, such as time lost in repairing tires, etc., and the total fares in dollars and cents that have been collected by the driver, as well as the amount of each individual bill. This record makes for honesty on the part of the driver, and the customer himself knows that in the event of any misunderstanding a complete and automatic record is available for the adjustment of difficulties.

ANTISUBMARINE TORPEDO USED FROM AEROPLANE

To enable an air craft to effectively attack an enemy submarine, a New Jersey inventor has developed a rather novel aerial torpedo which will explode at a predetermined depth beneath the water. It is slender and cylindrical in form, and provided with a sharp nose to insure its rapid and straight descent beneath the water after it has been dropped from a height. The head of the bomb is filled with a high explosive, while in a compartment at the opposite end are batteries and a detonator. A light cable, several yards in length, is attached to it and carries a pair of wires connected with the batteries. At the free end of the cable is a small parachute and immediately beneath it a contact device to which the wires leading from the batteries are attached. When this strikes the surface of the water it collapses, allowing two metal pieces to come together and close a circuit. This actuates the detonator and in turn causes the bomb to explode. A series of somewhat similar circuit-closing contrivances is arranged along the length of the cable and fitted with water-tight caps to prevent them from acting except when set to do so. An airman flying at a reasonable height is

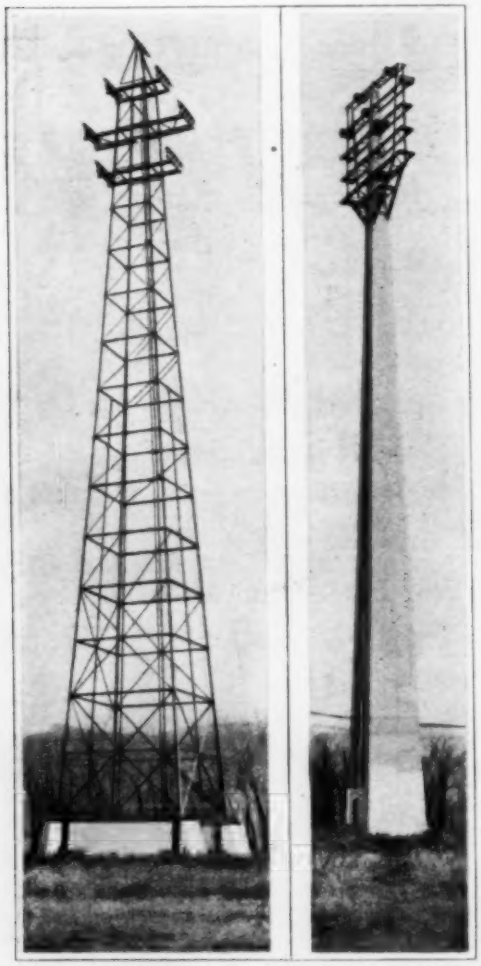


This Aerial Torpedo, Designed to be Dropped from an Aeroplane, can be Exploded at the Proper Depth to Wreck a Submarine: Inserts Show Diagrammatically the Torpedo with Its Battery, and the Contact Device

able to sight an under-water craft and also estimate its approximate depth. By setting one of the cable switches, or by relying upon the device at the parachute, according to the depth at which he wishes the explosion to occur, he drops the bomb in the course of the submarine. The resistance of the parachute keeps the cable practically straight, but does not interfere with the fall of the torpedo, so that the explosion takes place at the proper depth.

HIGH TOWERS LIFT WIRES ABOVE RIVER VESSELS

In extending transmission lines across the Ohio River, as well as other navigable streams, it is necessary to



Large Towers Which Carry High-Tension Transmission Lines across Ohio River

carry them at a sufficient height to provide a wide clearance for vessels. Two towers designed for this purpose have been erected on opposite sides of the Ohio River adjacent to Wheeling, W. Va., where there is considerable shipping. One of these is 235 ft. in height and of solid reinforced-concrete construction, while the other, built of structural iron according to the usual design, rises 250 ft. above its base. Together they support high-tension electric wires which have been projected from West Virginia into Ohio for power distribution. Part of their height is rendered imperative because of the radical changes in the level of the river during certain seasons of the year. A concrete tower of this type and size obviously attracts attention. It serves as another example of the rapid advancement which is being made in this field of construction.

BURSTING SHELLS KILL MEN WITHOUT WOUNDING THEM

Following nearly every big battle in the European war, bodies of dead soldiers have been found in the trenches in positions the men happened to be assuming when killed. The surprising thing about this has been that the bodies very frequently have borne no signs of external wounds. This has created much discussion and wonder. Lately, however, a report made before the French Society of Civil Engineers apparently explained the cause of these peculiar deaths.

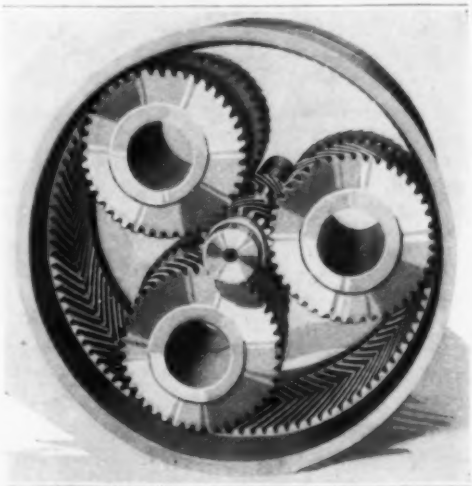
A pocket aneroid barometer was found in the uniform of a dead soldier who had not suffered any wound. An examination of the instrument revealed that two small levers operating the indicator hand were out of adjustment. Plainly a sudden and extreme lowering of the atmospheric pressure was the only thing that could have caused such a disarrangement. In order to check this point, the levers were returned to their proper position and the barometer placed under the bell of a vacuum pump. The levers became disengaged when the pressure was lowered to 16 in., which is about that normally experienced at the summit of Mont Blanc.

From this observation it was concluded that a bursting shell had suddenly reduced the atmospheric pressure about the soldier at least 14 in. This, and nothing else, explained the condition in which the barometer was found. The effect upon the human or-

ganism of such a depression would cause death by setting free oxygen and carbonic-acid gas held in suspension in the blood. These gases would be liberated in the form of bubbles which, on account of their size, would be caught and held in the capillaries. This would instantly stop the blood circulation and cause immediate death.

INTERNAL GEAR PROVES AN EFFICIENT SPEED CHANGER

Steam turbines in order to operate at best efficiency must run at relatively high speeds; likewise electric motors. There are many classes of service, however, which demand slow speeds from the source of power. To accommodate these, a manufacturer has now brought out an internal helical gear, designed to reduce the rate of revolution in any desired ratio. Being all contained within one housing the new speed reducer is much more compact than ordinary devices employed for the purpose. The center cogwheel and shaft revolve at the higher speed, while the outer is the slow-speed member. The middle pinion also serves as an oiler of the other members, the lubricant being pumped through a central hole in the shaft and sprayed through small lateral openings as the cogwheels revolve.



Internal Helical Gear Forms Compact Speed Reducer

ELECTRICALLY HEATED PORTABLE RADIATORS

A portable electric radiator which in general appearance resembles a steam radiator, has been put on the market.

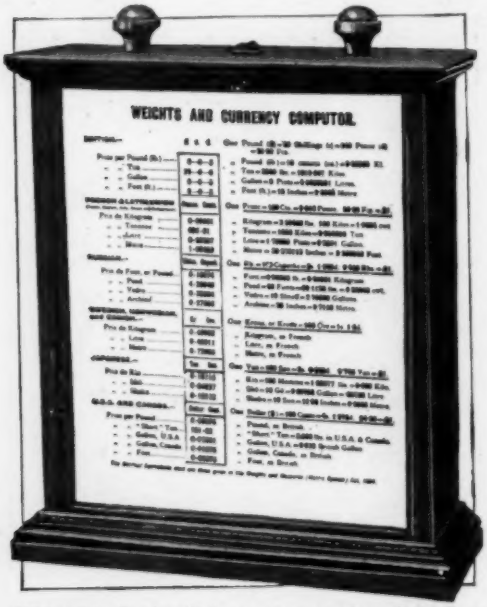
These Electric Radiators are Filled with a Commercial Fluid in Which is Submerged an Open Resistance Coil. Current is Secured from an Ordinary Light Socket

The principle involved in its construction is that of an open resistance coil submerged in a circulating, noncorroding, nonfreezing insulating liquid. The entire unit is hermetically sealed, preventing evaporation. The electric coil lies in the bottom of the radiator and when heated causes the liquid to circulate, giving an even temperature. Being mounted on casters, it can be moved about easily. By means of a flexible cord it can be attached to any ordinary light socket. The 500-watt size, the second of four sizes made, can be operated at about two cents an hour where four cents per kilowatt-hour is the charge for current.

¶Over 87 per cent of the parents participating in a recent post-card vote on the question, favored elementary military training in the Chicago high schools.

ELABORATE CALCULATOR FOR SIX CURRENCY SYSTEMS

A calculator which shows not only money values of one country in terms of several other countries, but applies those values to various quantities,



With This Device Prices per Foot, Ton, Pound, or Gallon can be Translated Quickly into Prices Expressed in Foreign-Money Terms Applied to the Proper Foreign Unit of Measure

namely, pounds, tons, gallons, and feet, and likewise to corresponding foreign measurements, has been patented by an English inventor. Thus, if an importer knows that the price of rice, for example, is 3 d. per lb. by English standards, the calculator will show that in Japanese terms the rice is worth .16115 yen per kin (or a trifle over 16 sen per kin). The device consists of a stationary sheet on which the tables of weights and measures of the various countries are printed one above the other. Another sheet placed under the former and wound on two spools set vertically in a case, contains columns of equivalent prices. A slot in the front of the case reveals one column at a time of this sheet, as shown in the illustration, and any column can be brought under the slot by turning the spools, the ends of which project from the top of the case. Besides tables for England's allies, tables for the following countries are given: Sweden, Norway, Denmark, United States, and members of the Latin Union. Additional comparative data appear on the case.

NEW TUNNEL IS LONGEST ON THIS CONTINENT

The Rogers Pass tunnel, which is five miles long, has been holed through and now supplants the Hoosac tunnel in Massachusetts as the longest tunnel on this continent, exceeding the latter by about a quarter of a mile. The Rogers Pass tunnel is notable also for the manner in which it was built and the rapid rate at which the work was advanced. Two pioneer tunnels were driven parallel with the main tunnel, but about 50 ft. from it. From these drifts, crosscuts were driven to the center line of the main tunnel and from these the main headings were driven. By this means the work was greatly expedited. In July, 1915, the two pioneer headings were stopped when less than a mile apart, and from these points the main headings were driven forward, meeting December 19, the average advance for each main heading having been 520 ft. per month.

ANY SPAN IN NEW BRIDGE MAY BE LIFT SPAN

A combined railway and wagon-road lift bridge across the Arkansas River, near Pine Bluff, Ark., has been built with lift towers which may be transferred from one portion of the bridge to another; the reason for this unusual construction being that the navigable channel is likely to change at times, due to the shifting sands that form the river's bed. The lift span is similar in design and dimensions to five other spans, and should the channel shift, the towers are simply transferred to another span. In the case of a near-by bridge such a shifting of the channel rendered a lift useless for passing

The Counterweights, of Which This Is One, are Made of Concrete Blocks and So can be Taken Apart and Moved Easily

Lift Span in Operation: It Has a Clearance of 50 Feet above High Water and 90 Feet above Low Water

A Bridge so Built That Any One of Its Spans may be Transformed into a Lift Span by Moving the Lift Towers

One of the Lift Towers Showing Flat-Linked Chains Used Instead of Cables, and the Folding Counterweight, in Center, Which Counterbalances Weight of Chains as They Pass over the Drums

boats, so that another had to be constructed.

The lift span moves vertically through a height of 49 ft. so as to provide a clearance above high water of 50 ft., and above low water, of 90 ft. The horizontal clearance is 225 ft. between piers. Ordinary vertical-lift bridges operate with wire cables passing over drums to counterweights. In this bridge flat-link chains are used. The main counterweights are composed of precast concrete blocks, supported in a steel frame. These can be taken apart and moved in case it is necessary to move the lift towers.

Another feature of the bridge is the cast-iron supplementary, or folding, counterweights, provided to compen-

sate for the transfer of the weight of the chains from one side of the drums to the other. Each consists of cast-iron disks, 3 ft. 5 in. in diameter and 2¼ in. thick, with projecting lugs for bolts which link them together. The upper disk is suspended from the tower by two bolts. The second is suspended from the first. The third is suspended from the second, and so on. The bolts in each disk are rotated slightly with respect to the bolts above.

When the main counterweight is at its lowest position, the folding counterweight is extended so that all disks are 1 ft. apart. As the former rises it picks up these disks, one at a time, their loose-fitting bolts permitting them to rest one on the other. When the main counterweight reaches its highest point it carries all the disks which counterbalance the links of the chains extending downward from the other side of the drums.

SURGICAL DRILL IS DRIVEN BY ELECTRIC MOTOR

For surgical purposes a motor-driven drill has been developed which, among other things, facilitates the operation

of boring into a bone when such procedure is necessary to relieve a fracture. Its parts are entirely inclosed in a metal housing which has somewhat the appearance of a large pistol. It is so constructed that after being used it may be placed in an autoclave with steam at a pressure of 15 lb. and thoroughly sterilized without being injured, providing it is subsequently dried with care. The chuck at the end of its propulsion shaft will receive a drill, or bur of almost any type, up to ¼ in. in diameter. The housing is arranged so that it may be removed quickly when the motor requires attention. Sunk in a pistollike handle at the posterior end of the device is a button controlling the motor, which has three speeds, varying from 1,200 to 4,500 revolutions a minute. A second handle, which may be adjusted to various positions to suit the demands of the user, is fitted, by means of a broad band, over the forward part of the shell. The instrument weighs slightly less than six pounds, is approximately a foot long, and develops 1/15 horsepower.

ELECTRIC SEWING MACHINE FOR DOMESTIC USE

One of the latest conveniences to be introduced for the modern housewife is an electric sewing machine of moderate cost. This is not an ordinary foot-power apparatus with a motor attachment, but an electrically driven machine specially designed. It may be connected with a house-lighting circuit just the same as a flatiron or fan, and operated at a low charge without any physical exertion whatever. The motor is compactly housed and permanently attached where it is out of sight, but within easy access. A light pressure with a foot upon the treadle starts the machine. Its speed is accelerated by increasing the pressure slightly. The needle stops almost instantly when the foot is removed. It is a matter of but a few seconds to change the machine so that it may be driven by foot power, if desired. This is done by disconnect-

A Pressing Board Designed to be Attached to the Machine, and an Electric Iron, are Supplied with the Equipment
Chain Connecting with Treadle Permits Foot Regulation of Motor
The Electric Outfit Makes It Possible for All of the Work to be Done in a Sewing Room Conveniently
This Shows the Motor Neatly Housed and Mounted in an Accessible Although Out-of-the-Way Position

ing a chain attached to the treadle and changing the belts. The machine itself is of a recent type, having the needle immediately in front of the operator so that there is no necessity of constantly leaning toward the left side while working, as was true with old machines. A pressing board and an electric flatiron are supplied with the equipment.

¶About 1,000 skilled mechanics have been released from the Canadian contingent in England to work in munition plants.

TEACHING OF TOUCH SYSTEM AIDED BY EYE SHIELD

An eye shield which is worn in a horizontal position below the eyes and prevents the wearer from seeing his hands while operating a keyboard of any kind has been patented as an aid in teaching the touch system of typewriting, piano playing, etc. One design consists of two pieces of celluloid which overlap and are fastened by a pivot or rivet. One edge of the shield is shaped to fit closely against the cheeks and nose of the wearer. A

valance of some soft fabric is fastened to this edge. The two parts overlap at the point where the nose fits against the shield and are so fastened that they

This Eye Shield is Designed to Cut Off the View of a Typewriter Keyboard or Piano Which a Pupil may be Playing, and So Aid in Teaching the Touch System

can be adjusted to fit various forms of face. Ear bows, similar to spectacle bows, extend diagonally upward over the ears. The shield is also held in its horizontal position by a diagonal brace reaching from the shield to the nose. Another type is made in one piece and can be cut to fit the face exactly.

STATUES IN PARK TO TELL STORY OF THE NATION

Groups of statuary, 20 in number, representing great epochs in the history of the United States are to be erected along East River Drive, Fairmount Park, Philadelphia, in compliance with the will of a former resident of that city. The income from approximately $750,000 has been provided for this purpose, and an association in whose custody the funds are placed is now seeking appropriate designs from leading sculptors for this notable public improvement. It is proposed to erect these works of art 100 ft. apart on the line of the East River Drive. Fully 10 years will be required to complete the task. The income from the bequest is more than $20,000 per year. When the series of historic groups is completed the will provides that the income is to be used in purchasing and placing in the park other works of art. This beautiful recreation spot is already famous for its statuary, and the prospective additions promise to make it one of the most richly embellished parks in America.

FISHERMAN USES HIS SAIL AS A CANOPY ON LAND

The sun beats down fiercely on certain portions of the Pacific shore line of the United States, but out of the direct rays of the sun the air is cool. An ingenious fisherman who has built a shack in a treeless region on the western coast has found it profitable to use his sail not only to propel his boat but as a shelter for his shack while he is on land. By hoisting it above his abode he protects from the sun both

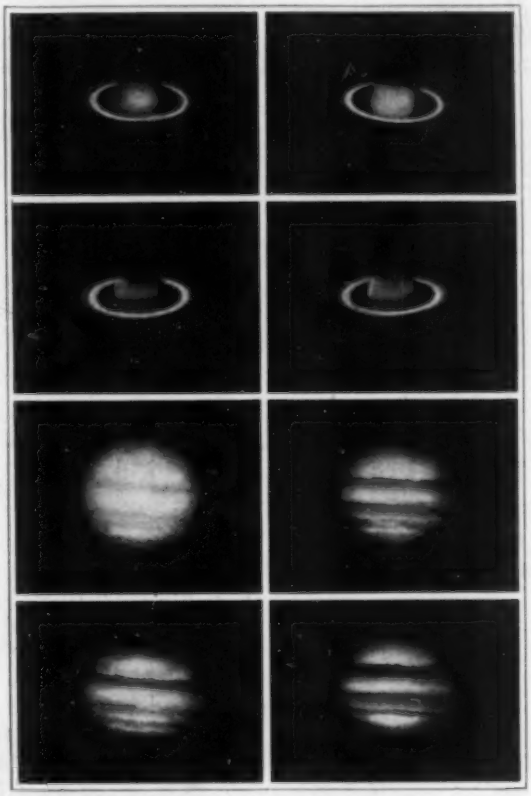
Western Fisherman Utilizes His Sail to Shade His Shack and Catch of Fish from the Sun

his hut and his catch of fish, which he deposits inside until he is able to sell them to passing motorists.

PHOTOGRAPHY OF THE PLANETS BY INVISIBLE RAYS

By R. W. WOOD

PRACTICALLY all sources of light emit rays which make no impression on the eye. If we pass a beam of white light through a prism it is decomposed, or spread out, into a rainbow-colored band or spectrum, and in addition to the colors which we see, there are invisible "infrared" rays adjoining the red, and "ultraviolet" rays beyond the violet. These rays can be detected by photography, and by other means. Objects illuminated by white light reflect these invisible rays to a greater or less degree, depending upon the nature of the substances of which they are composed. By the use of suitable ray filters, or screens, placed before the lens of the camera, which cut off the visible light but transmit the infrared or ultraviolet light, we can secure a picture of the object made by invisible rays, and in some cases draw certain inferences regarding the reflecting material.



The Four Top Views Are of the Planet Saturn. Reading from Left to Right, They were Taken by Means of Infrared, Yellow, Violet, and Ultraviolet Rays. The Four Lower Pictures Show Similar Views of Jupiter, Arranged in Like Order

Extensive experiments which I have recently made have brought out many interesting facts. For example, it was found that while some white flowers reflect the ultraviolet rays to a considerable degree, the majority come out quite black in the photographs. Certain white pigments (Chinese white, for example) appear quite black in ultraviolet light, and alterations or erasures on documents, made by chemical ink erasers, are instantly brought out, and in some cases the erased words are faintly visible in the pictures. Applied to astronomical problems, the photography of the moon by ultraviolet light showed an extensive dark deposit near one of the craters, which is quite invisible in yellow light, and check experiments made in the laboratory indicated that it was probably sulphur, or some sulphur-bearing rock. During the past autumn I have continued the work at the Mount Wilson observatory in California with the largest telescope in the world, a 60-in. reflector with a focal length of 80 ft. Photographs were made of the planets Saturn and Jupiter by infrared, yellow, violet, and ultraviolet light. The infrared screen was made from a combination of aniline dyes, and was similar to the screens by which the remarkable photographs of landscapes with snow-white foliage against a coal-black sky were taken.

For the ultraviolet work a new type of screen was used consisting of a rectangular glass cell closed by quartz plates and filled with dense bromine

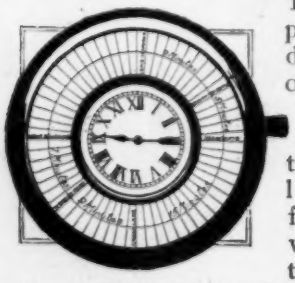
vapor, which is one of the asphyxiating gases used in the present war. Very remarkable differences in the appearances of the surface markings appeared in each case.

The differences were most striking in the case of Saturn, which in a powerful telescope is seen to be crossed by two or three faint cloud belts parallel to the equator, and the great ring which surrounds the ball of the planet. This appearance is shown in the photograph taken with yellow light. In the picture made by infrared light there is scarcely a trace of these belts, the ball appearing uniformly illuminated, while the picture made by violet light shows a very broad and very dark band below the region occupied by the faint belts seen in yellow light. A dark polar cap also appears. This very remarkable dark belt shows equally well in the ultraviolet photograph, though it is not quite as broad in this case, and the polar cap is smaller and less sharply defined. It seems probable that a spectroscopic study of these markings will be of great assistance in the determination of the materials in the planet's atmosphere which cause these striking differences. It may be an absorbing gas, such as chlorine, or possibly a fine mist or dust, which refuses transmission to the shorter waves of light (violet and ultraviolet). Jupiter also showed marked differences. The cloud belts, which are visible even in very small telescopes, are barely distinguishable in the infrared photograph; they come out well in the yellow one, while on the records made by violet and ultraviolet rays they are still more marked, and new ones come into view across the upper portion of the planet. A spectroscopic study of the two planets is to be made shortly at the Mount Wilson observatory, and until the results of this are known it would be rash to hazard a guess as to the composition of the atmospheres of these two planets. The photographs have pointed out the importance of making such a study.

Unfortunately the planet Mars was too far away for satisfactory experiments, though one photograph of it was made by ultraviolet light. When it comes into our neighborhood again, it is probable that results even more interesting than those obtained with Jupiter and Saturn will develop.

INDICATOR HELPS MOTORMEN KEEP SCHEDULE TIME

A time-schedule indicator, particularly useful for motormen, is being employed on an English tramway.



The central portion of the device consists of an ordinary clock. About the face of the clock is a large circular frame into which is fitted a cardboard ring. This is divided by radiating lines into 60 equal segments corresponding to the minutes of the hour. The names of the stops on the motorman's trip are written in clockwise order on this ring. The number of spaces separating the names corresponds to the number of minutes apart these points are on the schedule. The cardboard is then placed in the frame so that, at the time of starting, the minute hand of the clock will point to the name of the place where the journey begins. As the trip continues the motorman can tell at a glance whether he is ahead or behind his schedule. If desired, the return journey can be indicated on the other side of the cardboard. In case the trip is of more than an hour's duration a second ring can be inserted at the end of the first hour.

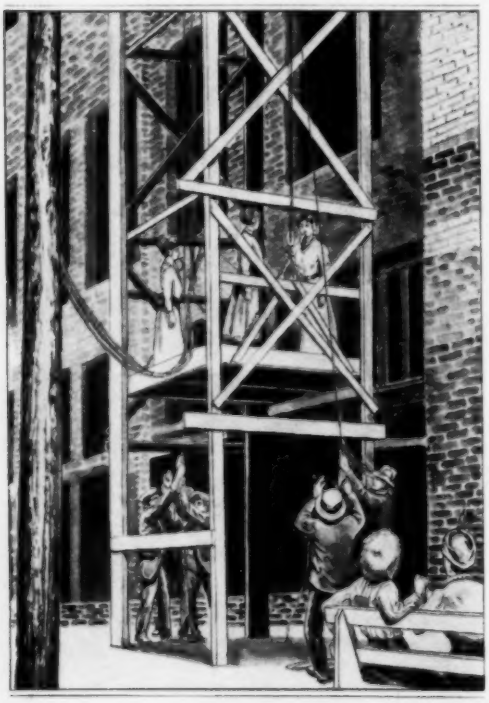
¶Arrangements are being made to supply the United States Coast Guard Service with aeroplanes to assist in locating derelicts and distressed vessels.

COMFORTABLE COSTUMES FOR THE OUTDOOR GIRL

Forestry Cloth Is the Material Used in the Three-Piece Hunting Suit, Consisting of Breeches, Coat, and Skirt, Shown at Left. The Skirt is Made to be Worn Also as a Cape. Polo Coat and Breeches of English Melton are Pictured in the Middle. The Vest Is of Hunter's-Green Billiard Cloth with Silk Polka-Dot Sleeves
COPYRIGHT, INTERNATIONAL FILM SERVICE, INC.
A Vest of Hunter's-Pink Duvetyne is Worn with the English Melton Riding Habit Above at the Right. The Derby Is of Hatter's Plush and Boots Black Russian Calf
Smart Three-Piece Sweater Set for Skating or Walking. At the Right the Chic Hat, Cushion, and Mufflike Work-bag Compose a Catchy Outfit for the Beach Girl at Winter Watering Places

SERVICE MAINTAINED WHILE SWITCHBOARD IS MOVED

A telephone switchboard was used in answering calls while being transferred by elevator from a temporary



By Lifting Simultaneously a Telephone Switchboard and Two Operators in This Temporary Elevator a Telephone Company Was Able to Give Its Subscribers Uninterrupted Service While Transferring Its Apparatus to the Second Story of Its New Building

shelter to the second floor of new telephone headquarters. This occurred recently in an Oklahoma town. After all the connections had been properly adjusted and after the new location was made ready the switchboard and two telephone girls were placed on a temporary elevator constructed outside the building and hoisted to the second floor. During the transfer not a single connection was lost or delayed. The new building is on the site of the one formerly used. When the time came to tear down the old one, the telephone apparatus was moved entire to temporary quarters without causing the subscribers any inconvenience or loss of service.

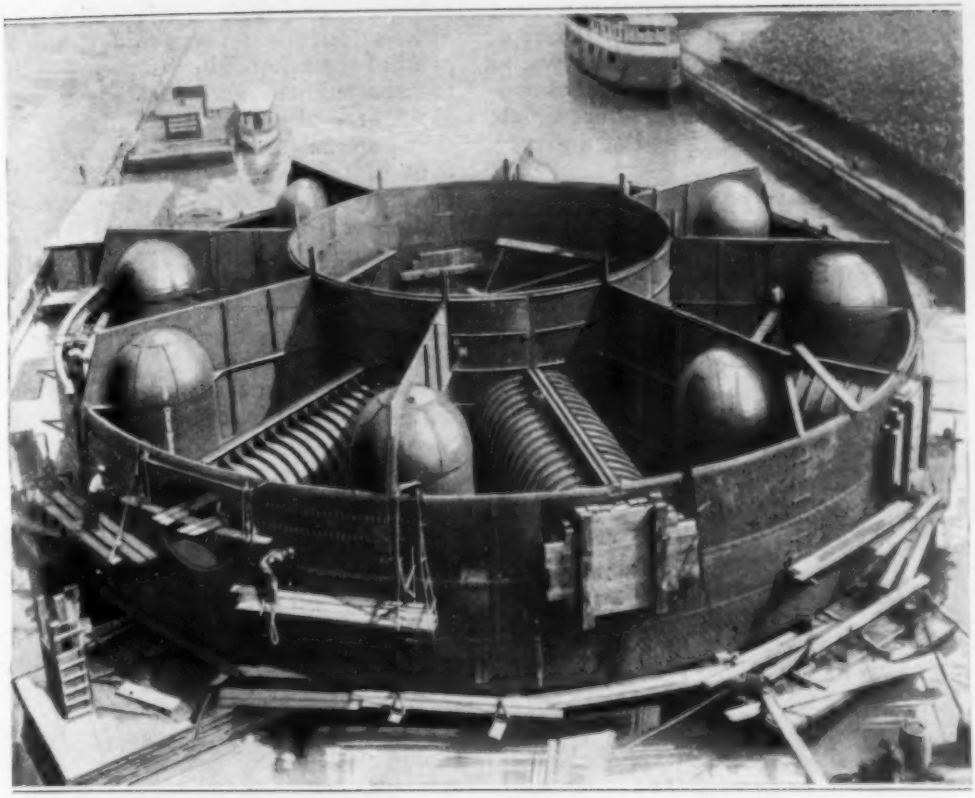
LONG NATURAL-GAS PIPE LINE FOR WINNIPEG

A natural-gas pipe line, 800 miles long, is being constructed from the wonderfully rich natural-gas fields of southern Alberta to Winnipeg, Manitoba. This project, which ranks with the greatest undertakings of its kind, will cost $10,000,000. The proposed line has been under consideration for some time, but only recently was it announced that the necessary bonds had been floated. Previous to that action the entire proposed route was examined in detail by expert engineers. When the line is completed it will supply about 20 towns and cities in addition to Winnipeg. These will include Brandon, Regina, and Moose Jaw. Very great reductions in fuel costs are predicted as a result of this big improvement.

NOVEL SUBSTRUCTURE BUILT FOR WATERWORKS CRIB

In design, the substructure of a crib recently constructed for the intake connection to a new waterworks tunnel under Lake Michigan at Chicago is novel. It is of a type quite different from any hitherto employed by the city. Instead of entering the tunnel through sluiceways at the level of the tunnel, the water is taken in through ports above the bottom of the lake and rising to the water level inside the crib overflows, through screens, into a vertical well connecting with the tunnel below the crib. Essentially it consists of two concentric steel shells, the inner one cylindrical and the outer conical, joined by radial arms. It is bottomless, has a diameter of 90 ft. at the base and embodies approximately 450 tons of steelwork. The first section is vertical and 17 ft. in height. From this point the outer shell tapers to a height of 45 ft., where it has a diameter of 70 feet.

The erection of the device was started on a scow, 106 ft. long and 26 ft. wide, and four pontoons, each about 15 by 30 ft. in size. When the first,



Sealing the Ports in the Substructure in Order to Provide a Sufficient Air Column to Keep the Shell Afloat during the Remainder of Its Construction

or vertical, section of the structure had been completed the ports were covered with bulkheads, the flotation chambers filled with air, and the scow and pontoons flooded and withdrawn by a tug. The rest of the work was then erected and the structure towed into the lake to a point three miles off the foot of Wilson Avenue, where it was sunk 35 ft. by admitting water to its buoyancy chambers. Subsequently the water between the inner and outer shells was pumped out and the space filled with concrete.

DESK AND RECORD CASE COMBINED

A combination desk and record case which is being manufactured has a capacity for several thousand cards, all of which are placed within arm's length of the user. The outline of the top of the desk roughly resembles a rectangular "U." The person using it sits between the two arms of the "U," facing the connecting portion, which is

This Combination Desk and Record Case Makes Thousands of Cards Almost Instantly Available to the User

smooth-topped like an ordinary writing table. In the top of the remainder of the desk may be set cards in rows, as shown. Any desired card is obtainable very readily, since its approximate location can be determined at a glance.

KNEE CUSHION INCREASES FLOOR WORKER'S COMFORT

Cement finishers, tile workers, floor polishers, carpet layers, and many

Padded Knee Cushions Reduce Discomfort of Kneeling Posture

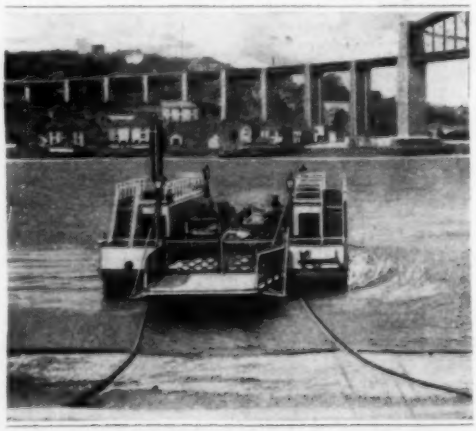
others, must work most of the time in a kneeling position. For their special convenience a new kind of knee cushion has lately been brought out. It is made of heavy leather, thickly stuffed, and held in position on a man's leg by straps at each end. Using the cushion tends to prevent muscular cramps, "housemaid's knee," and similar afflictions which trouble workers at these trades.

FLIES VIRTUALLY UNKNOWN IN HAVANA

"A city without flies"—an ideal of sanitarians still regarded as an impossibility by many—is an accurate description of Havana, Cuba, which not only is free from these pests, but of mosquitoes as well. As is well known, Havana once was fever-ridden, and its present remarkable health record is due to scrupulous municipal cleanliness. No source of flies or other disease carriers seems to escape the watchful eyes of the sanitary staff of the city. Recently an officer reported that he had observed a plant grown in the residential district which apparently was breeding flies. Experiment showed larvæ present in the fruit. If further investigation confirms this finding all plants of this kind in and around Havana will be destroyed and the vigilant officer will be especially rewarded.

FERRY USES CHAINS AS GUIDE ACROSS RIVER

To cope with an exceedingly strong current a curious ferry on the River Tamar at Saltash, South Devon, England, makes use of a pair of heavy chains firmly attached to the shores on either side. They lie on the bed of the river and a cogwheel arrangement on the boat worked by steam picks up the chains link by link as the river is crossed. Though very old, the ferry



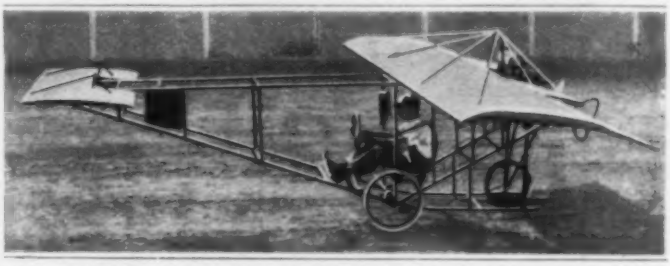
Ferry across River Tamar in England Uses Chains Attached to Shore As Guide in Coping with the Strong Current

is still in successful operation and makes a number of trips each day.

¶The use of sea-lion hides for leather has been proposed in Canada.

BABY MONOPLANE IS DRIVEN BY MOTORCYCLE ENGINE

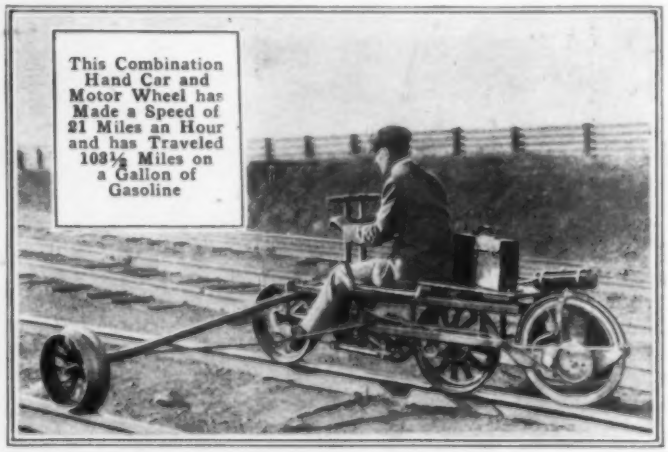
What is undoubtedly the smallest successful monoplane in the world has recently been constructed by a Californian. In addition to this distinction the machine is almost as unusual in design as it is in size, for it is driven tail first by an ordinary 7-hp., twin-cylinder motorcycle engine. It weighs, complete with its gasoline tank filled, only 238 lb., has a wing spread of 18 ft., an over-all length of 16 ft., and a supporting area of about 90 square feet. The motor drives a 4½-ft. propeller at about 1,400 revolutions a minute, giving the craft a speed of nearly 60 miles an hour. The power plant is placed at the extreme rear of the machine so that its weight is balanced by that of the pilot who rides several feet ahead of it. In this particular the craft is apparently well designed. The tail-first feature of the machine loses much of its oddity when the early types of the Wright biplane, which had their elevators forward, are recalled. The machine has been driven a number of times, and during these flights has remained in the air from 15 minutes to a half hour. To many, at first sight, it might appear impossible for the small motor to even lift the machine off the ground. It should be realized, however, that the craft it has to lift in its new function is more than 100 lb. lighter in weight than the motorcycle from which the engine was taken.



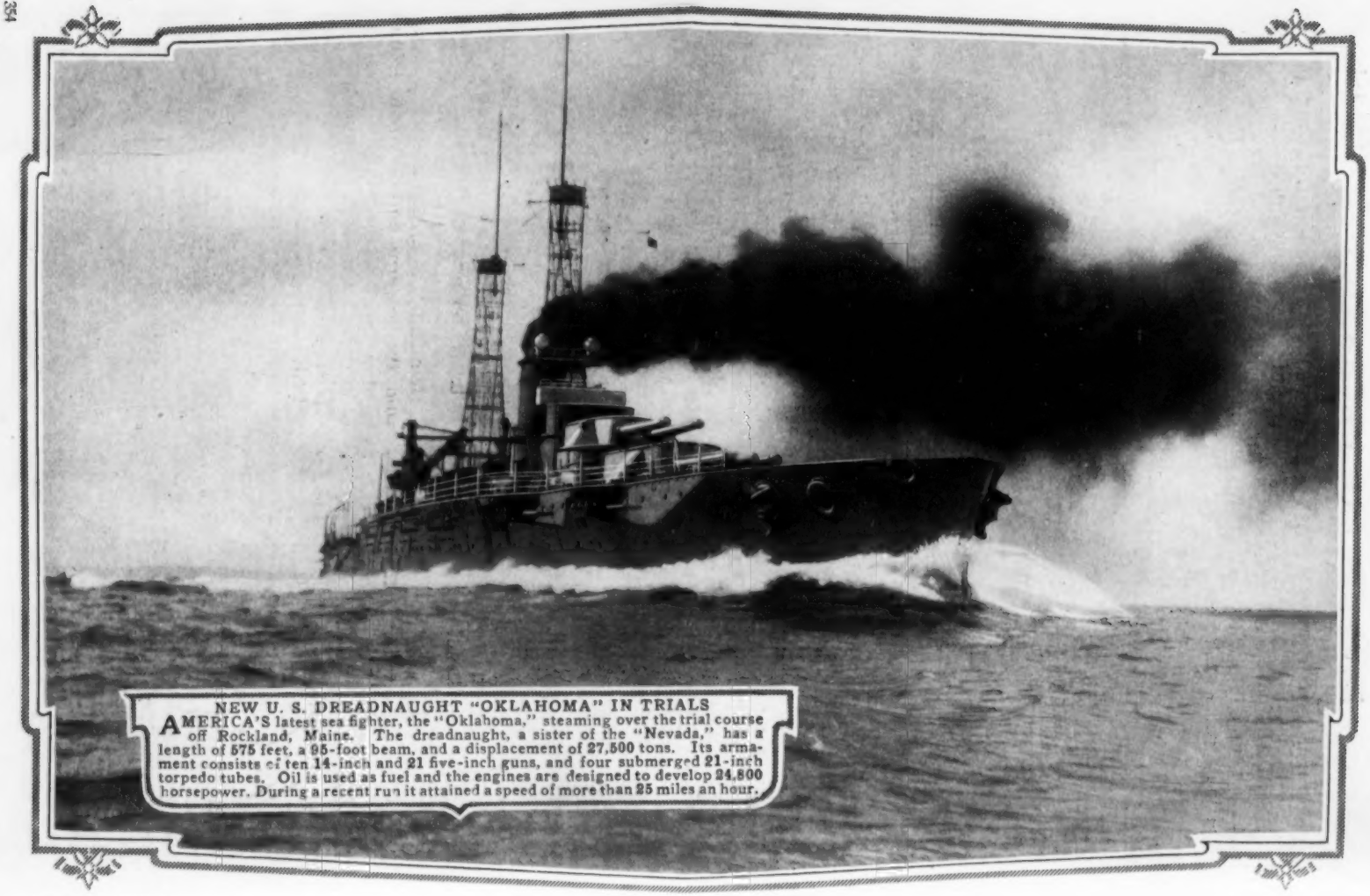
This Tail-First Monoplane, Probably the Smallest Flier in the World, is Propelled by a Seven-Horsepower Motor

HAND CAR DRIVEN BY MOTOR WHEEL AT LOW COST

A power-driven railroad velocipede which is inexpensive to operate and capable of comparatively high speed has been devised by attaching a motor wheel to an ordinary three-wheeled hand car. The power wheel is fastened flexibly to the rear of the velocipede in line with its two main wheels. Its weight is sufficient to keep its rubber tire from slipping on the steel rails. Attached to the handles of the velocipede are the throttle and other controlling apparatus. A speed of 21 miles an hour has been obtained with this car, and 103½ miles have been traversed with one gallon of gasoline. The wear on the tire is slight.



This Combination Hand Car and Motor Wheel has Made a Speed of 21 Miles an Hour and has Traveled 103½ Miles on a Gallon of Gasoline



NEW U. S. DREADNAUGHT "OKLAHOMA" IN TRIALS

AMERICA'S latest sea fighter, the "Oklahoma," steaming over the trial course off Rockland, Maine. The dreadnaught, a sister of the "Nevada," has a length of 575 feet, a 95-foot beam, and a displacement of 27,500 tons. Its armament consists of ten 14-inch and 21 five-inch guns, and four submerged 21-inch torpedo tubes. Oil is used as fuel and the engines are designed to develop 24,800 horsepower. During a recent run it attained a speed of more than 25 miles an hour.

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THE NEW BRITISH ZEPPELIN DESTROYER

By R. J. BJURSTEDT

WHY did England have three months immunity from air attack? and why, when these attacks were renewed, did they come in the form of aeroplane rather than Zeppelin raids?

Probably no one person, either in England or Germany, could answer both of these questions definitely, and the best that the writer—who has recently come from the war zone—is able to do will be to tell of one or two developments which have had a considerable bearing on the situation.

That the destructive air raids of the night of Oct. 13, 1915, were not repeated on the several succeeding nights on which the state of the moon was favorable to Zeppelin operations was due to two circumstances: bad weather conditions and the fact that the air-defense squadrons of London —goaded by the taunts and criticisms of the indignant populace—took the desperate risk of night flights. The whizz of propellers was heard over all of the southern and eastern suburbs of the metropolis during each of the several nights following the big raid, and on at least two occasions the "pride of place" thus attained was responsible for the turning back of reconnoitering Zeppelins.

What the cost of this reckless expedient was, only Sir Percy Scott and those intimately associated with him in the air defense of London are able to tell, but it is certain that it was very heavy. Outside of a few guiding lights in Hyde and Regent parks, and at Hendon and other of the suburban flying stations, London—unlike Paris, which has adequate facilities for flying at all times—has no provisions for night landings. The number of accidents on the occasion in question—judging from the reports on the streets of London spread by those who claimed to have actually seen the wreckage of aeroplanes at widely separated points in the environs of the metropolis—was very considerable. The writer was taken by a friend to the country place of a neighbor of the latter where an aeroplane had crashed down into a huge beech tree at five o'clock on the morning of October 15, supposedly as a consequence of engine trouble. Both occupants had been killed and the machine torn to pieces. Every vestige of the wreckage—including souvenir fragments taken away from the owner of the place—had been removed by the air-defense men before 10 o'clock of the following day, and only the battered and scarred old beech remained to bear its silent evidence of the tragedy.

This measure won London a dearly bought immunity during the remaining moonless nights of October (the Zeppelin menace is considered almost negligible on nights when the moon is sufficiently bright to allow safe aeroplane action), and by the time the "open season" of November had arrived, a new instrument had begun to figure in the air defense of England. This is what might be called a Zeppelin destroyer. No official statement has yet been made regarding it, but the writer has learned enough to be able to state that the new machine is a small, heavily engined and extremely fast dirigible which is calculated to bear about the same relation to the great German airship, against which it is built to operate, as the submarine boat does to a battleship or cruiser.

Not until the war was well launched did the government of Great Britain realize that, in neglecting to develop a large rigid-framed airship as an offset to the Zeppelin, it had been guilty of almost as great a neglect as Germany would have been chargeable with had it failed to follow England's dreadnaught lead on the water. Had the Zeppelin proved a sweeping success as an offensive instrument, England would have been left helpless, as indeed she may yet be should time and events prove that large Zeppelin squadrons can cross the North Sea and attack with the same impunity enjoyed by the scattered units so far employed.

Realizing the futility of endeavoring to develop during any probable duration of the war an adequate rigid-framed airship capable of meeting the Zeppelin on equal terms, the British bent their efforts—once order began to resolve out of the chaos of the first few months of the war—to the construction of a Zeppelin destroyer. As the Zeppelin itself—with its large crew, heavy engines, and huge fuel supply—must, to a certain extent, sacrifice speed and mobility to weight-carrying capacity, the way seemed open for the construction of a swift non-weight carrier which, while able to out-speed and out-maneuver the Zeppelin, would still be far more stable and generally safer than the aeroplane. This is the type the British have striven to perfect, and, from what I have been able to gather in England, not without considerable promise of success.

No one has yet reported seeing one of the new machines in the immediate vicinity of London, but in November, 1915, the writer, on a short visit to a port near the mouth of the Thames, saw pass in the twilight a strange "hybrid" which bore close resemblance to the descriptions that had been given him of the Zeppelin destroyer. From this glimpse I would describe it as either a heavily planed dirigible or a "ballooned" aeroplane. Whether the gas envelope had a rigid frame or not I was unable to judge, and on this point there is a good deal of diverse opinion. It is agreed, however, that the destroyer has the speed of a very fast aeroplane, and, what is especially important in the work for which it is designed, can rise even more quickly than aeroplane or Zeppelin. The great points claimed for it are that, unlike the aeroplane, it can stay out all night and wait till daylight to pick a landing and, unlike the Zeppelin, can plane down to safety in case its gas bags are riddled. Being designed for defense, and having, therefore, no great fuel supply to reckon with, it is able to "run" to guns and engines, in both of which it is very powerful. The crew I have heard estimated as running all the way from a half dozen to twenty, and it is, of course, by no means unlikely that the machine has been built in different types and sizes.

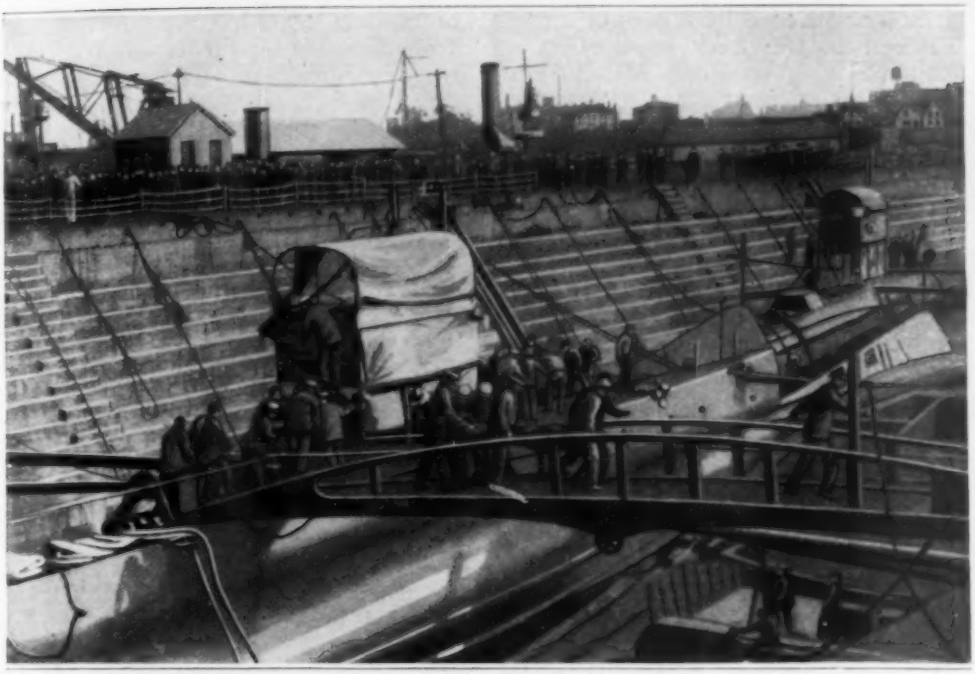
I heard no definite account up to the time I left England at the beginning of this year, of an encounter between destroyers and Zeppelins, but I do have information that the presence in the air of these machines was responsible for turning back Zeppelin attacks at the coast on at least three occasions in November and December. Their real test, however, will only come when, or if, Germany essays her long-threatened big raid on London, and this may well have eventuated before these lines are in print.

HYDROGEN EXPLOSION CAUSE OF SUBMARINE TRAGEDY

America's second submarine disaster occurred at the New York Navy Yard, January 15, when a gas explosion in the engine compartment of the "E-2" partly wrecked the interior of the craft and caused the death of five men, as well as the injury of several others. The submersible was in dry dock undergoing a general overhauling when the accident happened.

Hydrogen, generated by the storage batteries, accumulated in the engine room, forming with the air a highly explosive mixture which became ignited by a spark of unknown origin. The boat is equipped with the new Edison batteries which are intended to prevent the generation of chlorine and other deleterious gases when the submarine is beneath the surface. Owing to the low voltage and amperage at the time, it is deemed probable that there was a reversal of the voltage in some of the cells, and that this was responsible for the development of an excessive amount of hydrogen.

During the official inquiry it was found that the starboard ventilating motor had not been running, and that



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Carrying the Dead and Injured from the Submarine after the Fatal Explosion. The Picture Shows the Craft Below

the starboard outtake of the after battery, through which hydrogen should be discharged into the open air, was closed. From these and other facts it was reasoned by one expert that the gas from the after battery passed from the compartment through a companion way, into the engine room, where the explosion was most severe. The board in its report stated, "that there were two pockets of this mixture, one at the after end of the after battery and the other at the forward end of the forward battery; and it appears that the initial explosion occurred at the after end of the after battery."

The batteries in the "E-2" were the only ones of the kind so far installed in a submarine. The same type, however, is being placed in the new "L-8," now under construction. When it is determined whether the batteries themselves were responsible for the explosion, the future policy regarding their use will be settled. According to the chief engineer of the Edison works, the batteries were not at fault. Before the disaster they had proved satisfactory.

ICY WALKS MADE SAFE BY SAND SPREADER

The dangers due to icy sidewalks and pavements have been eliminated in Grand Rapids, Mich., through the use of a simple sand sprinkler drawn by one horse. It consists essentially of a heavy wooden bin, narrow at the bottom, with a capacity of a cubic yard of sand. This is mounted on an axle, connecting a pair of heavy wheels. In the bottom of the bin are about fifteen ¼-in. holes, 4 in. apart, which may be

This Device is Used for Sprinkling Sand on Icy Pavements: The Flow of Sand is Controlled by the Lever at the Rear

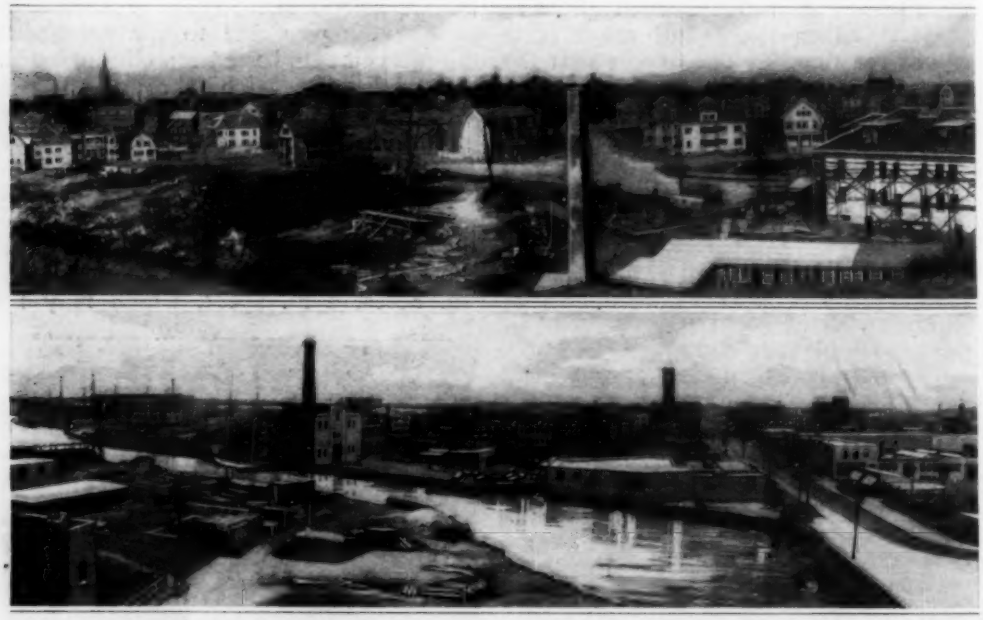
opened and closed by means of a lever fastened to the back of the bin as shown. By drawing the device about, thin trails of sand can be sprinkled wherever desired.

SALEM RISING FROM ASHES SURPRISINGLY QUICK

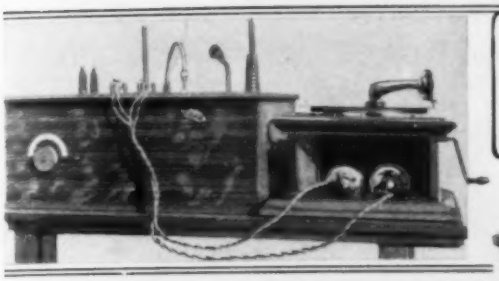
In a little more than a year and a half, Salem, Mass., has risen from a vast ash heap to a city of new buildings, a large percentage of which are at least semi-fireproof. The great conflagration which razed the historic place late in June, 1914, destroyed some 1,800 buildings and 41 factories. Already approximately 700 structures and 11 industrial plants have been erected in the midst of the ruins. One of the interesting features of this reconstruction is to be found in the fact that the taxable value of the new buildings exceeds by nearly $1,000,000 that of the property which was destroyed. This is a graphic manifestation of the spirit which is being exercised by those who are rebuilding the city. The majority of the new structures are built of brick, and none of them is roofed with wooden shingles. Salem still bears many scars of its great disaster, for crumbled foundations of former buildings and charred trunks of trees are to be seen throughout the fire area. These marks, however, are rapidly being eradicated and a new and better-built city is springing up with surprising quickness.

MUSIC TRANSMITTED BY WIRELESS TELEPHONE

A young California inventor has designed an apparatus whereby selections played on a phonograph have been transmitted to several neighboring homes which are equipped with special receiving instruments. In some instances the instruments have been installed in the dining room and by this arrangement the neighbors have been entertained at mealtime. A wireless-telephone apparatus upon which the inventor has been working several years is used at his central station. A



Top View: All the Buildings Included in This Panorama Are New except the Church in the Background at the Left, Which Withstood the Flames during Salem's Great Conflagration. Lower View: The Power House at the Left, in the Foreground, Is a Remnant of Salem before the Fire. The Rest of the Buildings, Most of Which Are of Brick Construction, Are New



Wireless-Telephone Apparatus at the Sending Station Showing Transmitters Placed in the Horn of a Phonograph, Music from Which was Transmitted to Several Receiving Stations

Library Table Equipped with a Receiver and Megaphone through Which was Heard Music from a Distant Phonograph Attached to a Wireless-Telephone Outfit

phonograph, in which the horn is an integral part of the body of the instrument, is used in producing the selections. The slats are removed from the mouth of the horn and within it are placed two ordinary telephone transmitters, from which the sounds are carried by wires to the wireless-telephone outfit which, after serving as an amplifier, sends the waves through a cable to the aerial on the roof, whence they are discharged into the air.

The waves are caught by the various receiving stations and conveyed by wires to receivers, each of which is fitted with a small megaphone. In several instances head appliances with a pair of receivers were used. In others a single megaphone was sufficient for a group of persons. The inventor claims that the music heard at the receiving stations is fully as loud as that at the central station. By increasing or diminishing the amount of electrical energy used the volume of sound heard through the receivers is correspondingly varied.

JAPAN ADORNS TRAMCARS IN RULER'S HONOR

In the principal cities of Japan the street cars were decorated in celebration of the emperor's enthronement last November, many of them carrying curious emblems which brought into vivid contrast the ancient and modern aspects of that oriental country. In Tokyo and Kyoto the flower cars were particularly beautiful. Chrysanthemums, cherry blossoms, wistaria, and Japanese flags were used profusely. Inscriptions on pennons proclaimed "Long Live the Emperor!" Symbolism played an important part in all the decorations. One car carried a "Fêng-whang," a mythical bird, often called the Chinese phœnix, which according to Japanese tradition will appear only in countries ruled by a wise monarch. A turtle and a crane, symbols of long life and good fortune, were stationed on another car. Folk dances were performed on some of the trams by little girls.

A Japanese Street Car Decorated with Flags, Chrysanthemums, and Electric Lights in Celebration of the Emperor's Enthronement

GIANT MAIL BOX A FEATURE OF PROMOTION CAMPAIGN

A United States mail box, 18 ft. high, 12 ft. wide, and measuring 6 ft. from front to back, has been erected on a business street in Portland, Ore., for the purpose of calling attention to and inviting contributions for a letter-writing contest which has been inaugurated by the chamber of commerce of that city. In design and appearance the box very closely resembles standard mail boxes used in many parts of the country. So tall is the receptacle that cleated ramps leading to a platform have been built in front of it for the convenience of its users. In the contest of which the mail box is a publicity feature, prizes have been offered for the best letters setting forth reasons why people in the eastern states should move to or visit Portland and vicinity.

This Mail Box, Which Is 18 Feet High, was Erected in Portland, Ore., as a Feature of a Letter-Writing Contest Inaugurated by the Chamber of Commerce

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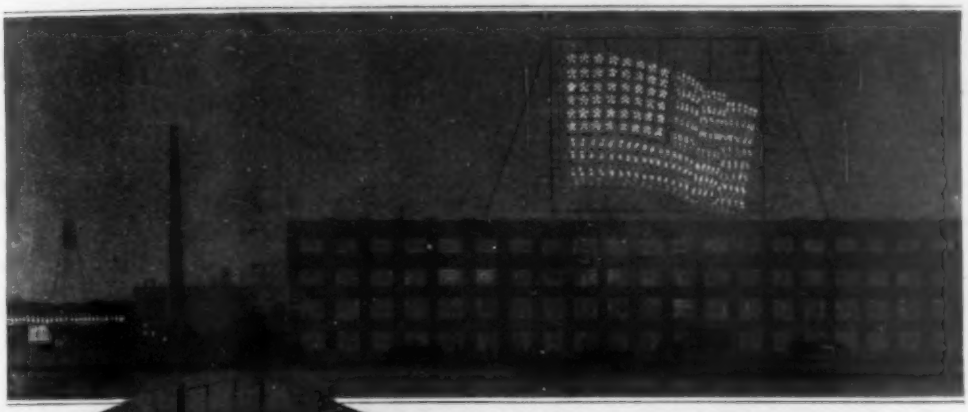
¶A society woman was badly burned recently when the spangles on her dress, which are supposed to have been celluloid, caught fire

ARTESIAN WELLS TRANSFORM QUEENSLAND, AUSTRALIA

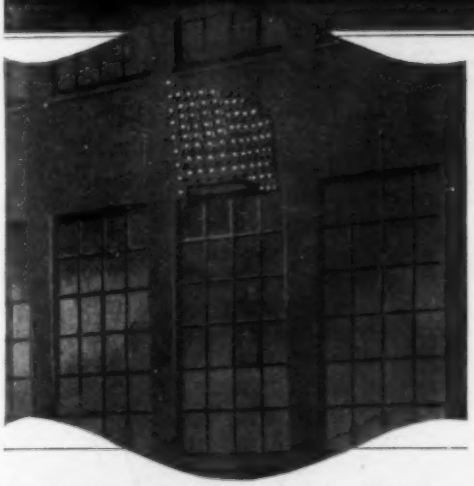
A great transformation has been wrought in the western part of the state of Queensland, Australia, since the practicability of tapping vast supplies of artesian water has been demonstrated. Now great tracts which have only a limited rainfall are well grassed and stocked with cattle and sheep. At the beginning of 1914, there were more than 2,000 artesian wells in Queensland, with an average depth of 1,061 ft. The deepest bore is over 5,000 ft. and yields 70,000 gal. per day, while in one instance 2,000 gal. per day is obtained at a depth of only 10 ft. The aggregate depth of all the wells is 417 miles. Analyses of the water show various results. Some of the bores yield water that is good both for irrigation and domestic purposes; the supply from others can be used in irrigation only, and from still others is not suitable for either purpose.

ELECTRIC-LIGHTED FLAGS ERECTED AT FACTORIES

In an endeavor to instill a sense of loyalty to America in the minds of the thousands of foreign-born workers employed in industrial plants throughout the country, a movement is being started to erect electrically illuminated flags on factory buildings in various parts of the United States. The propaganda is credited with having had its origin at Cleveland where the president of a factory had a massive electric flag placed on top of one of the company's biggest buildings. His reason for doing this was that the several hundred



This Emblem, One of the Largest Electric Flags in America, "Floats" from the Top of a Factory Building at Cleveland



One of 22 Illuminated Flags Placed Inside and Outside of a Big Motor-Car Plant at Toledo

employes of the institution labored day in and day out and rarely saw the national emblem. The man had no idea of starting a country-wide movement. As soon as publicity was given the matter, however, the idea was carried out at other places. At Toledo, for instance, a prominent motor-car company has lately had 22 electric flags installed on both the outside and inside of its buildings. Many of those placed in the interior of the structures remain lighted day and night, and are seen continually by hundreds of workmen.

¶A shortage of licorice, which in times of peace comes from Greece, Turkey, and southern Russia, threatens to affect the tobacco market, since that ingredient is an important element in tobacco products.

ANNEXATION OF TERRITORY GIVES CITY ODD SHAPE

Through the recent annexation of the San Fernando Valley, Los Angeles has acquired a most peculiar shape. The outline of the city as now constituted is not merely unusual, but strikingly odd. By bringing a large district to the northwest, consisting of a number of towns and large ranchos, within its corporate limits, it has spread out

Map of Los Angeles and Environs Showing Unusual Shape City has been Given through the Annexation of Additional Territory

until it contains approximately two square miles more territory than does New York. The total area of the city is 288 square miles. The annexation was put through in order to enable it to take water from the Owens River aqueduct to operate municipal power stations along the latter's course. The legality of taking more water than was used within its boundaries was questioned, and this brought about the annexation of the adjacent territory. An interesting point in this connection is that two towns within the San Fernando district failed to vote in favor of annexation. This has left them entirely surrounded by the city of Los Angeles. "The Shoestring," a narrow connecting link extending between the city proper and the waterfront, does much to give the place its freak shape.

FOLDING STEEL SERVICE WAGON

An ornamental and convenient piece of furniture that can be used to save many steps to and from the kitchen is a steel service wagon which may be folded into small space. When so folded it will stand alone. The wagon is fitted with either two or three trays, which are of wood and can be removed when desired. The wagon is designed to carry dishes, food, etc., and usually is placed within reach of the hostess while she is serving. It rolls on two large rubber-tired wheels and two small metal wheels. The steel is given any desired wood finish to match the trays. In construction the article is simple and substantial and at the same time pleasing in appearance.

This Steel Service Wagon can be Folded into Very Compact Form

ELECTRICITY FOR FACTORY HAULED ELEVEN MILES

Following a disagreement with a gas company as to the equity of its gas rates, the proprietor of a candy factory and store in St. Paul daily has been hauling electricity 11 miles for the purpose of operating his establishments. Each morning he has sent from two to four small motor cars loaded with storage batteries to his branch store in Minneapolis, where the batteries are charged, and then back to St. Paul. This unusual arrangement has been maintained for some time, and though the gas company has discontinued its service, the plant has been lighted and the candy kettles have been heated without apparent inconvenience. It is said that the candy maker also has had current from an underground wire. He claims that the electricity secured through storage batteries has cost him about the same as he would have to pay the gas company. In order that he may be permanently independent in the matter of lighting facilities the manufacturer contemplates erecting a windmill on the top of his factory to run an electric plant in the basement.

PROPAGATE SOCKEYE SALMON IN SAMISH RIVER

Efforts are being made by the fish commission in the state of Washington to cause the blueback salmon, commercially known as the sockeye, to propagate in the Samish River, a small stream which empties into Samish Bay some distance south of Bellingham.

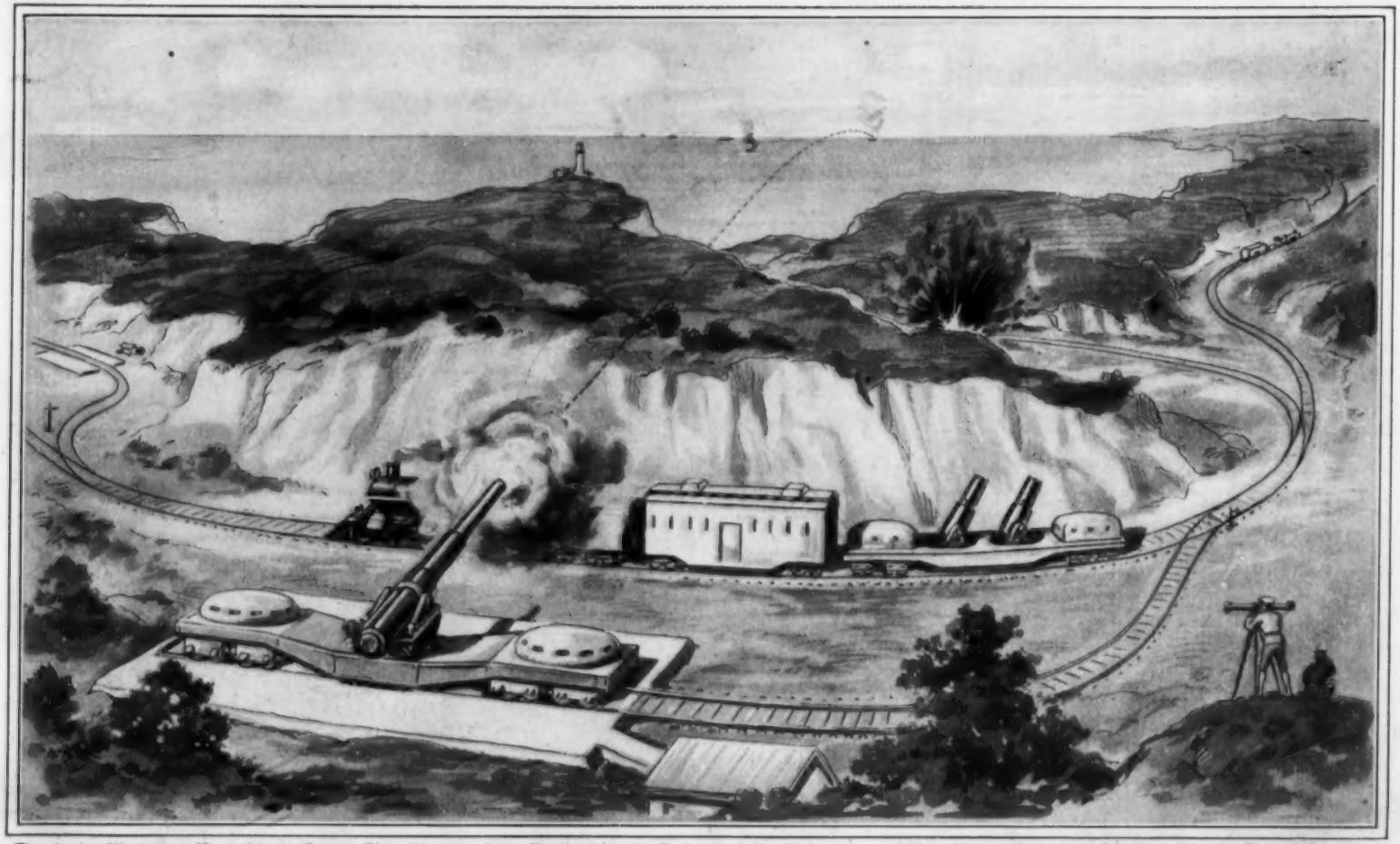
This move has been made in an attempt to prevent the supply of this variety of fish from diminishing. The inherent trait of the salmon to return to its birthplace to spawn makes the success of the venture probable. The young are always hatched in fresh water, where they spend a number of months and then swim to the ocean, remaining there until they reach maturity. The sockeye stays at sea for four years, after which it returns to its native stream, lays its eggs, and dies.

Tens of thousands of these fish race through the Strait of Juan de Fuca and on up to the Fraser and other rivers annually. It is when the big schools make their runs, going on both sides of the international line, that the fishermen make a harvest. The idea of the Samish River undertaking is to cause more of the bluebacks to return to American waters than now, which in this case would divert into the Samish a proportion of those passing through the strait.

In carrying out this plan, a large number of sockeyes were caught some time ago and placed in large floating crates which were towed to the mouth of the Samish, where the fish were released. A dam had been constructed across the river some distance up the stream to divert the fish into Friday Creek, where one of the state hatcheries is located. When the fish arrived at that point they were seined, the eggs extracted and fertilized, and then allowed to develop. The source of the creek is a fresh-water lake, and there the young fish stayed for a number of months before making their way to the ocean. There is little doubt that after the allotted period they will return to the Samish to spawn, instead of going to the Fraser, for which their parents were bound when captured.

One of the Large Floating Crates in Which the Salmon were Towed from Puget Sound to the Mouth of the River

Taking the Sockeyes from the Nets near the Hatchery After They had been Brought to the Samish from Salt Water. The Eggs were Removed and Cared For Until the Young Fish were Hatched



The Artist Illustrates Herewith the Latest Plan That has been Evolved for the Defense of Our Expansive and Now Almost Unprotected Seaboards: An Eastern Inventor Proposes the Construction of a Large Number of Gun-Carrying Railway Cars So Designed That They might be Locked to Concrete Bases Established at Frequent Intervals along Transportation Lines Skirting Our Coasts. These Mobile Batteries would Provide a Dependable Means of Resisting an Invasion at Any Point on Either the Atlantic or Pacific Sides. The Plan has been Thoroughly Worked Out on Paper and Already Submitted to the War Department at the Request of the President

MOBILE DEFENSE BATTERIES FOR COAST PROTECTION

Serious attention is being given by military authorities to a comprehensive system of coast defense which has been conceived by a New York inventor and recently submitted to the War Department at the request of the president. In brief, the plan contemplates the construction of a special type of railway car on which heavy ordnance would be permanently mounted; the establishment of concrete bases at prescribed intervals and at strategic points along the seaboards; the utilization of existing railway lines, and, wherever necessary, the projection of new tracks.

The general idea is not altogether an original one, but the details of the scheme, particularly as applied to the equipment, are. The concrete foundations would serve as fixed mountings for the big guns, each being so designed that a car could be locked to it quickly and its armament brought into action almost immediately. These bases would be built on spurs radiating from main-line tracks and extensions, and concealed singly or in groups behind hills or woods, and in cuts. The armed cars would be kept at conveniently located stations from which they could be rushed at high speed to any point where they might be needed to resist an invasion.

Two of the most attractive features of the system are its flexibility and the comparative reasonableness of the cost of establishing it. Once in effect, the plan could be extended to protect the interior of the country, thus providing a defense system for our inland cities, railway centers, and industrial points, which are now entirely unguarded. Existing railway facilities margining the coasts of Massachusetts, Rhode Island, Connecticut, New York, and New Jersey, are so situated that 140 gun bases could be established and, without grouping, present at least six long-range batteries to a hostile force which might attempt a landing at any point. This scheme could be worked out, it is estimated, for a little more than the cost of one modern dreadnaught. At the present time only about 300 miles of our 5,000-mile coast are protected.

About 300 gun-carrying cars would be needed on the Atlantic seaboard to adequately defend it against attack. Each of these cars would cost approximately $150,000, while the expense of building the necessary concrete bases would vary between $3,000 and $4,000 each. The weight of one of the cars would amount to about 100,000 pounds, while its ordnance would weigh approximately 170,000 pounds. A complement of about 30 men would be assigned to each car during war time. In case of an enemy gunner getting the range of one of the mobile defense batteries the car could be unlocked in a moment's time and moved to another base. This constitutes an additional advantage which the proposed system apparently has over the fixed fortification, already proved by the European war to be far from impregnable.

WOULD MAKE TWO COLLIERS INTO ARMY TRANSPORTS

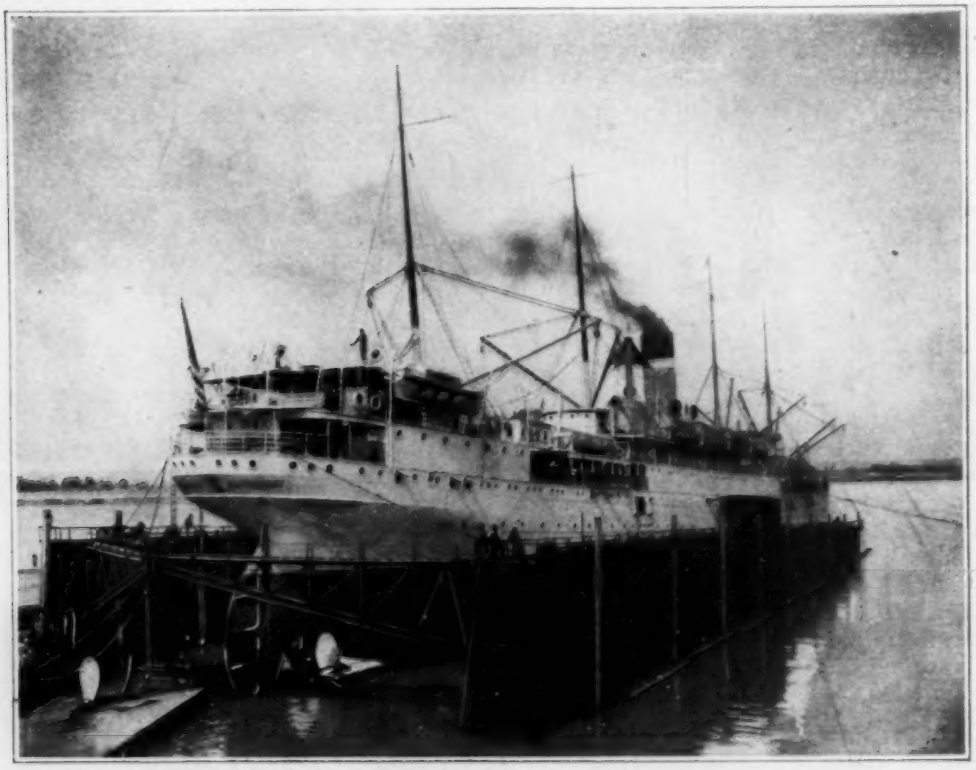
The secretary of war has recommended to Congress enactment of necessary legislation giving the army instead of the navy possession of the ships "Ancon" and "Cristobal," now located at the Panama Canal. The original legislative provision was that on completion of that waterway the vessels were to be turned over to the Navy Department to be used in the coaling service. But owing to the steadily increasing use of oil as fuel, it is said that soon the navy will have very little use for the present type of naval colliers. Since the transport service of the army is not adequate even for the regular army, an agreement has been reached between the two interested branches of the government to transfer these two boats to the War Department. By an expenditure of $500,000 these boats can be transformed into what will be the largest and fastest transports possessed by our land forces.

PROPELLER MENDED IN DRY DOCK SHORTER THAN SHIP

Less than 24 hours were required to dry-dock the United States army transport "Thomas" in Honolulu and repair its broken propeller, during a recent voyage from San Francisco to Manila. The floating dry dock used for this task has a capacity of 4,500 tons while the "Thomas" is an 11,000-ton vessel, and is 118 ft. longer than the dry dock. But by allowing the bow to overhang the excess length, the dry dock was able to raise the stern so as to bring the propellers out of the water, permitting three blades to be removed and new ones substituted. The service performed by this dock could not have been rendered by a basin dry dock of the same dimensions because a vessel placed in a dock of the latter type must be shorter than the dock, to permit the gates to be closed.

WAR AND HEAVY DEMAND AT HOME RAISE CAR COSTS

Because of the heavy demand for motor cars and the high prices of motor-car materials, a number of manufacturers have announced increases in the prices of their products to take effect immediately or within a few months. A number of factors have contributed to this reversal of a tendency which has characterized the motor-car market in recent years. The war has been one of the causes which have occasioned a sharp rise in the price of various grades of steel, aluminum, copper, etc. The allies have been heavy buyers of cars and at prices which have reacted on the home market. Consequently those manufacturers who have only a limited supply of raw materials on hand have been compelled to raise the price or lower the quality of their products.



The Transport "Thomas," an 11,000-Ton Ship, is Here Shown being Repaired in a Floating Dry Dock Which Has a Capacity of Only 4,500 Tons. The Boat Is 118 Feet Longer than the Dry Dock

Rescue Party Digging about Cars Clinging to Outer Rail on Side of Slope After Avalanche had Struck Train and Knocked Other Cars down Mountain Side

AVALANCHE WRECKS TRAIN HIGH IN CASCADES

Within a short distance of the point where a similar disaster occurred several years ago, a passenger train bound from Spokane to Seattle was struck by an avalanche on the west slope of the Cascade Mountains near Corea, Wash., late in January. A dining car and day coach, which were at the rear of the train, were caught by a great, rushing mass of snow, boulders, and trees, and swept into a gulch 300 ft. below, where they were buried. A third car, a Pullman, was thrown on one side and knocked to the edge of the gully. Several persons were killed and about a score injured. The tragedy happened on a horseshoe curve, where the train had been flagged shortly before and was being held until the track ahead could be cleared of the debris of a previous slide. While the train was waiting the avalanche broke loose in the mountains and came roaring down the slope at terrific speed, snapping off tall pines and dislodging boulders in its path.

¶American machinery, costing $700,000, is to be used in equipping two new cotton mills in China.

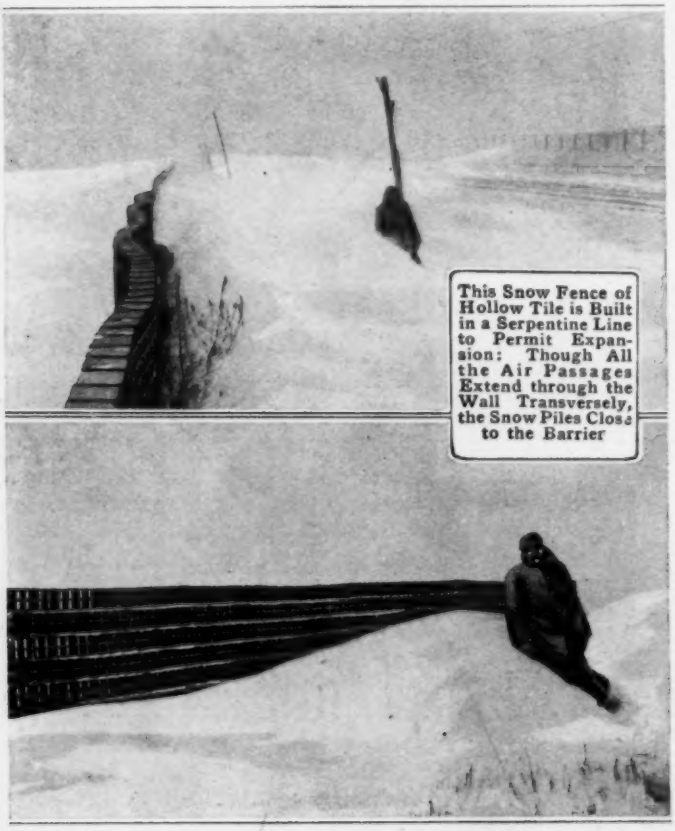
TELEPHONE MOUTHPIECES OF BLACK-GLAZED PORCELAIN

Telephone mouthpieces of black-glazed porcelain, and several other articles made of this material instead of hard rubber, have been produced by an eastern pottery company, which believes that for many purposes black-glazed porcelain will prove superior to hard rubber. All but the threads of the porcelain mouthpieces are black. The material has, of course, all the well-known insulating qualities of porcelain, is impervious to moisture, and will withstand extremes of temperature, especially heat, better than rubber. It is nonabsorbent, can be kept clean easily, and besides has the not unimportant advantage that its cost of production, so the manufacturer claims, is much lower than that of hard rubber.

TILE WALLS SURPASS SNOW FENCES OF BOARDS

Successful experiments have been made in Iowa in the use of hollow tile for snow fences, the results showing that such barriers will hold back about twice as much snow as the board snow fences. This barrier is made of six or seven layers of tile, the open ends forming the two faces of the wall,

which is slightly serpentine to permit expansion. Wires are used for reinforcement. The tiles are molded in such a manner that air spaces extend through them at an angle of about 20°. The tiles are so laid that all the air



This Snow Fence of Hollow Tile is Built in a Serpentine Line to Permit Expansion: Though All the Air Passages Extend through the Wall Transversely, the Snow Piles Close to the Barrier

This Hollow-Tile Snow Fence Acts as a Splendid Windbreak Because the Angles at Which the Various Air Passages are Placed Are Such That They Produce Conflicting Currents of Air That Neutralize One Another

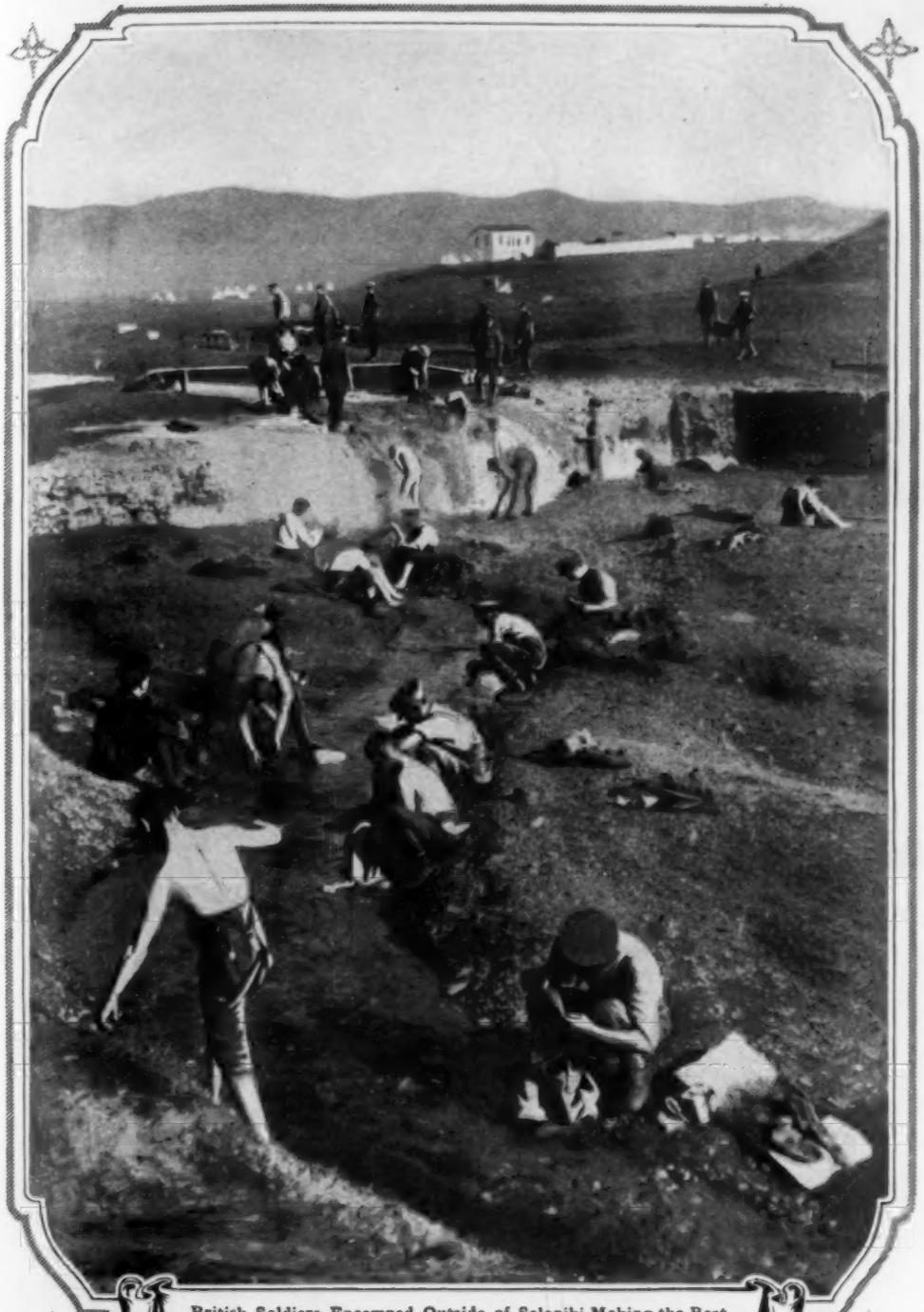
passages lie in a plane parallel with the earth's surface but those of adjoining layers lie at opposing angles. When the wind passes through this fence, these diverging openings form conflicting strata of air which neutralize each other's force so that it is comparatively calm at the leeward side of the shelter. This accounts for the large amount of snow that collects behind these shelters, which will last longer than wooden ones, and in summer may prevent the spread of fires started by passing engines.

PHILADELPHIA TO RESTORE INDEPENDENCE SQUARE

The surroundings of historic Independence Hall are to be more fully restored to their original colonial aspect, according to plans recently drawn up on behalf of the Philadelphia city authorities. The present flagstones in front of Independence Hall and along Chestnut Street will be retained. But the areas between the State House, as it is sometimes called, and Congress Hall, on the west, and the city buildings on the east, will be paved with brick as they were originally. On two lines parallel with Chestnut Street, where the brick and flagstones meet, will be set rows of cast-iron posts similar to those formerly existing in the square, the purpose being to give a sense of inclosure without interfering with the traffic. Back of Congress Hall the old drive will be restored with cobblestones, protecting chains, posts, etc. In a portion of the central area of the square the flagstones will be relaid. A number of paths, which have been made in recent times and serve no useful purpose, will be obliterated, the whole intention being to simplify the treatment of the square and bring it in closer harmony with Independence Hall as well as the other adjoining buildings.

¶A letter-carriers' association has petitioned Congress for the privilege of wearing a tiny American flag on the left coat lapel.

TOMMY ATKINS' WASH DAY IN THE NEAR EAST



British Soldiers Encamped Outside of Saloniki Making the Best of Their Opportunities to Bathe Themselves and Free Their Uniforms of Some of the Filth Gathered in the Trenches. A Small Brook Not Far from Their Camp Was a Welcome Substitute for the Marble Baths and Steam Laundries of Peaceful Times

MODERN MONITORS IN USE BY BRITISH NAVY

In the Insert One of England's Monitors Mounting a Single 15-Inch Rifle Is in Action Bombarding the German Naval Base near Ostend. Below, the "Severn," Its Deck Awash, and the "Humber," End On, are Shown. The Heavy Armament, Shallow Draft, and Effectiveness of These Vessels have Given Them Renown. When the War Began They were being Built as River Warships for Brazil. They were Finished as Monitors by the Admiralty

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THE ALLIES AND TURKS AS SEEN BY THE CAMERA

Above: Cans of Water Piled at a Station in the Desert for the Use of the Turkish Forces upon Their Arrival at the Point

Left: British Colonial Troops and Senegalese in Street of Town on Island of Lemnos Ready to Embark for Dardanelles

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One of the Turkish Strongholds on Gallipoli Peninsula: The Troops Seen at the Right Are Almost in Readiness to March to the Trenches Some Distance Away

WITH WARRING TROOPS ON ICY BATTLE GROUNDS

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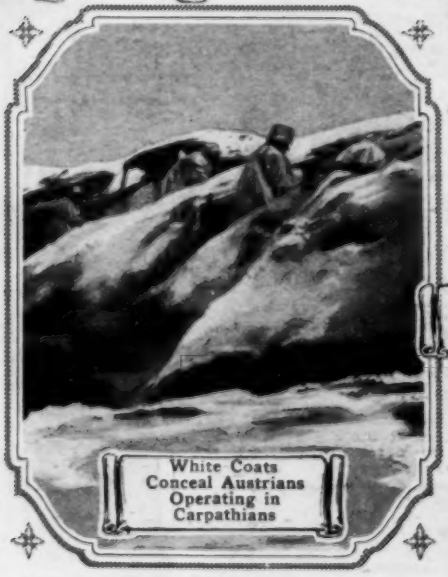
Austrian Ski Patrol Resting on Snow-Clad Slope: These Men Cover Distance Quickly and Form a Valuable Arm of the Service

Laborers with Germans in Poland Armed with Shovels

German Ski Patrol Crossing Improvised Bridge in Vosges



White Coats Conceal Austrians Operating in Carpathians

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Russian Soldiers Snatching a Few Minutes' Sleep in the Snow

German Infantry in Snow-White Uniforms

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AUSTRIAN WINTER CAMPAIGN IN TYROLEAN ALPS

One of the Desolate Mountain Positions Held by the Austrian Troops Operating against Italians: The Trench Is More than a Mile and a Quarter above Sea Level on Stilfser Joch

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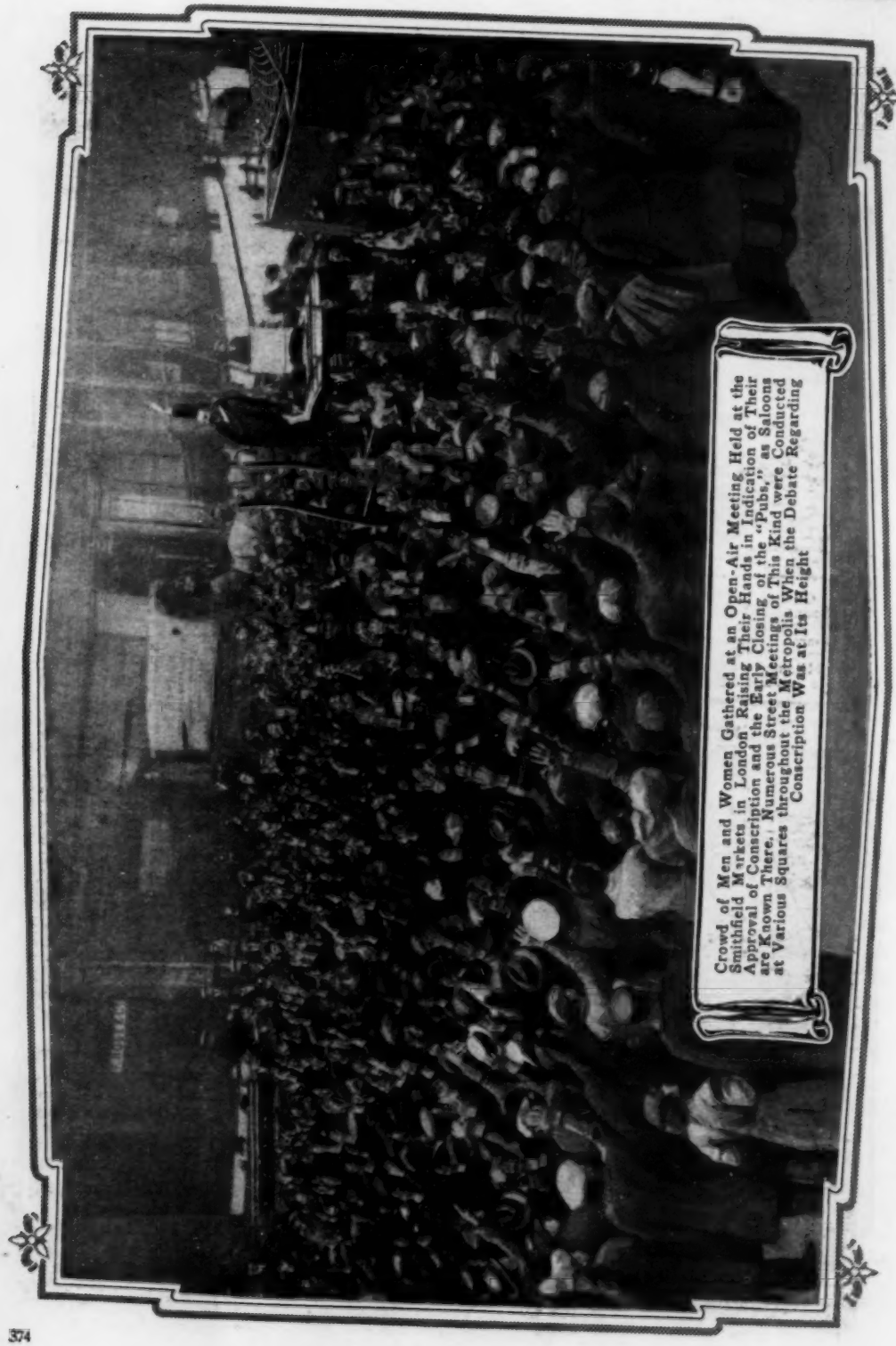
Constructing a Suspension Pass along Side of Cliff to Provide New Avenue of Attack

Mountain Artillery Battery Descending from Stronghold near Frontier to Establish New Position and Check Movement of Italian Forces

LONDON STREET CROWD FAVORS CONSCRIPTION



Crowd of Men and Women Gathered at an Open-Air Meeting Held at the Smithfield Markets in London, Raising Their Hands in Indication of Their Approval of Conscription and the Early Closing of the "Pubs," as Saloons are Known There. Numerous Street Meetings of This Kind were Conducted at Various Squares throughout the Metropolis When the Debate Regarding Conscription Was at Its Height

WHILE AUSTRALIANS MARCH MILES TO ENLIST

Australians Marching 320 Miles to Volunteer Their Services to British Crown

Reception Given Volunteers upon Arrival at Sydney: Starting with 30 Men, Band Grew to Several Hundred

Many British Girls have Sweethearts' Regimental Insignia Tattooed on Arms

Transport Departing from Sydney with Troops for Eastern War Zone. The Event Bore Every Appearance of a Gala Affair. Piers were Jammed with Thousands of Cheerers

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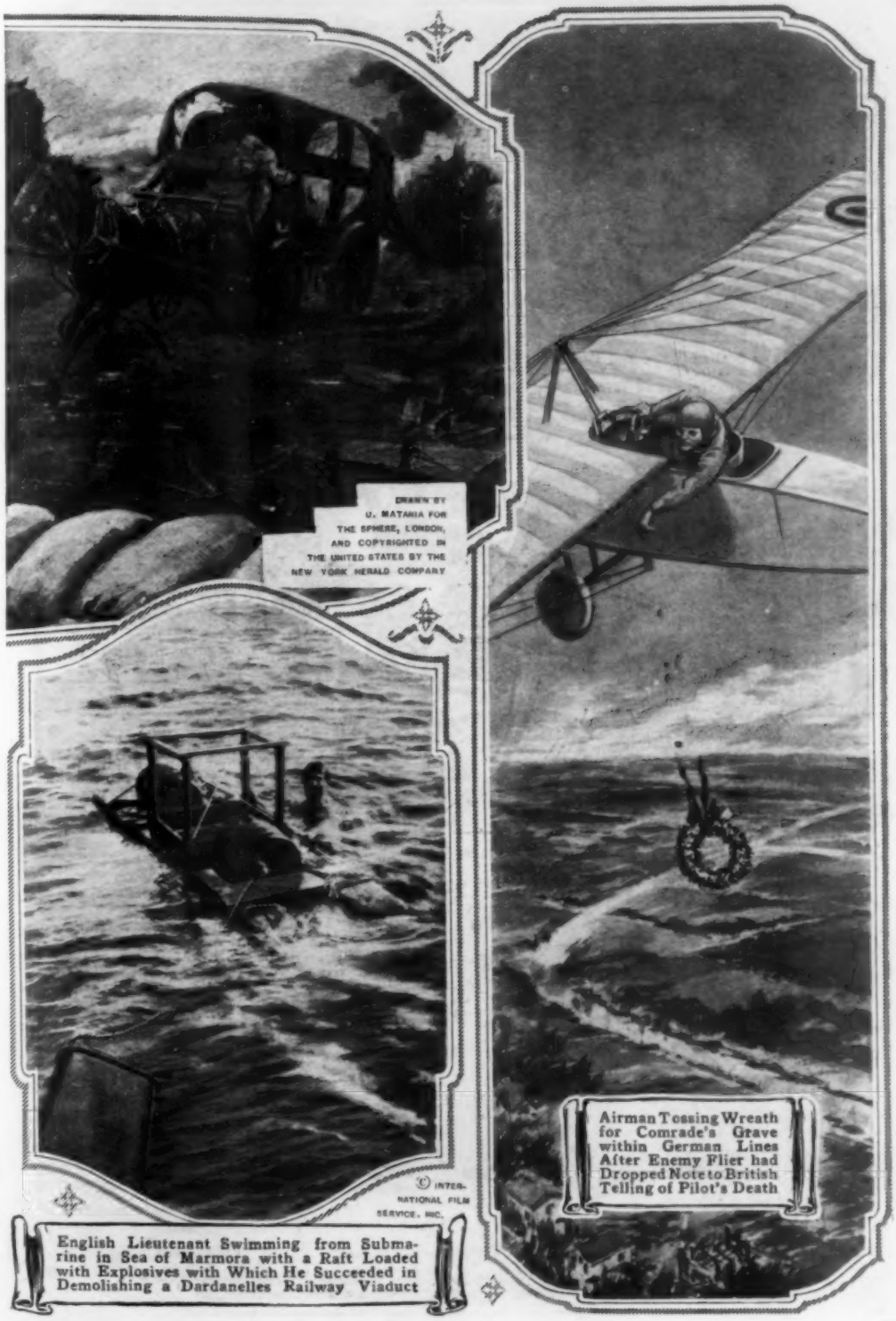
Large Austrian Shell Bursting Close to an Italian Artillery Shelter Which It Wrecked

Team of Terrified Ambulance Horses, the Driver Dead, Lunging toward a British Trench during the Heat of Battle. The Animals were Stopped on the Brink of the Excavation

Bombs Dropped from German Air Craft Bursting in Midst of Troops in Action in South Africa. After Launching the Projectiles the Airman Snapped This Picture and was Later Captured

DURING BATTLES IN DIFFERENT THEATERS



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English Lieutenant Swimming from Submarine in Sea of Marmora with a Raft Loaded with Explosives with Which He Succeeded in Demolishing a Dardanelles Railway Viaduct

Airman Tossing Wreath for Comrade's Grave within German Lines After Enemy Flier had Dropped Note to British Telling of Pilot's Death

PREPARING FUEL FOR SOLDIERS IN TRENCHES

Italian Boys and Girls Pasting Sheets of Paper Together and Winding Them into Long, Hard Rolls to be Used as Fuel by Troops

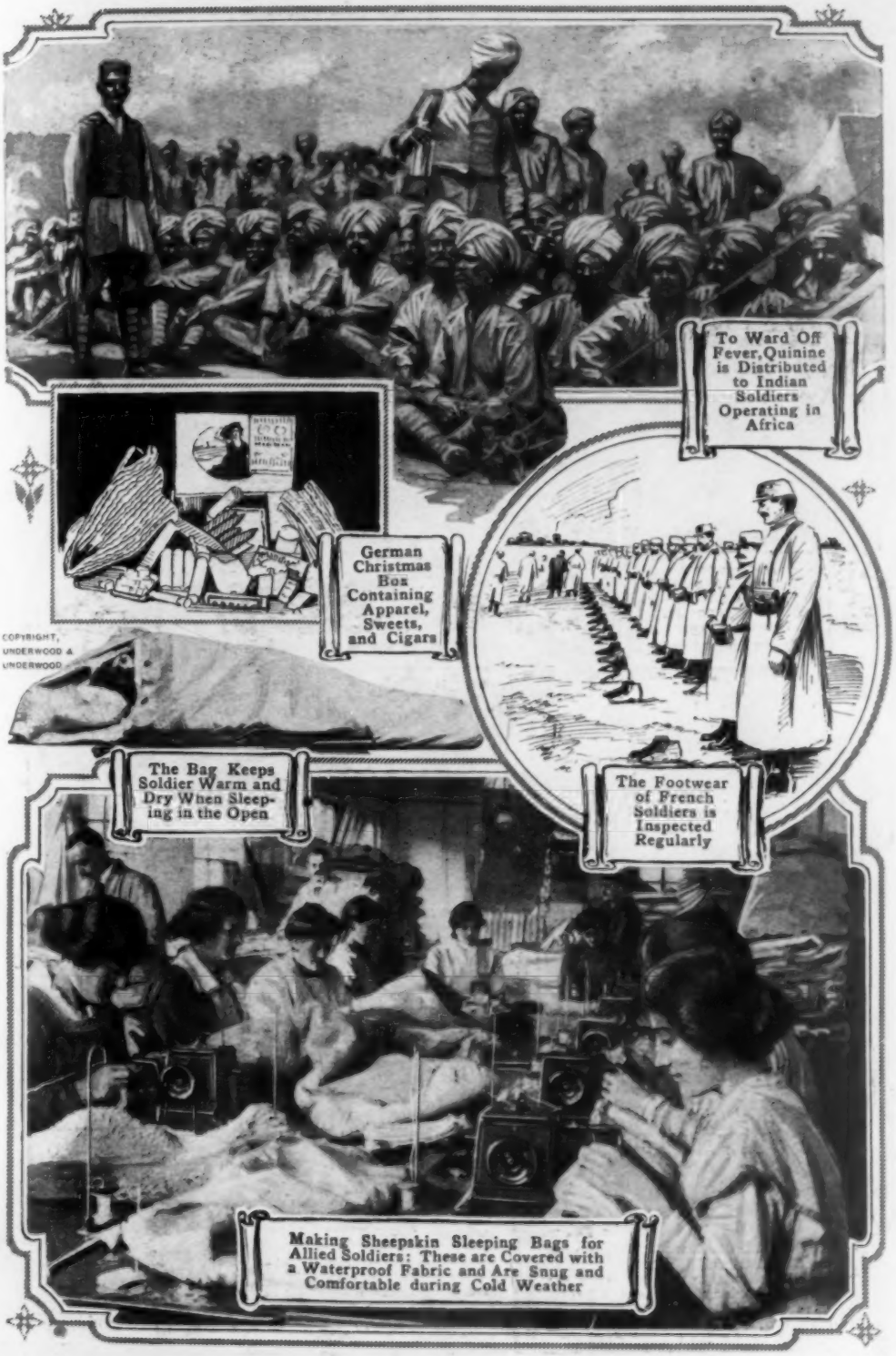
Paper Sticks are Cut and Used Like Coal

Children Packing Paper Fuel in Individual Bags to be Distributed among the Soldiers

Both Ends of Matches Supplied German Soldiers are Dipped

Making Charcoal in Britain for Men in Trenches: This Is the Ideal War Fuel, for It Provides Abundant Heat without Producing Smoke

LOOKING AFTER WELFARE OF PRIVATE SOLDIER



To Ward Off Fever, Quinine is Distributed to Indian Soldiers Operating in Africa

German Christmas Box Containing Apparel, Sweets, and Cigars

The Bag Keeps Soldier Warm and Dry When Sleeping in the Open

The Footwear of French Soldiers is Inspected Regularly

Making Sheepskin Sleeping Bags for Allied Soldiers: These are Covered with a Waterproof Fabric and Are Snug and Comfortable during Cold Weather

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PHOTOGRAPHS TAKEN WITHIN FRENCH LINES

Abandoned German Gun with Muzzle Blown Off to Prevent Its Use by Enemy

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A Public Motor Bus Now Serving at the Front as a Pigeon Loft

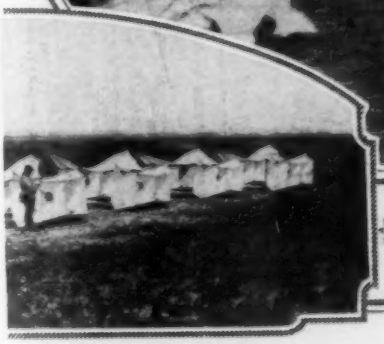
The Red-Cross Dog Shown Here has Found a Wounded Soldier and is Bringing Back the Latter's Helmet. These Animals are Trained to Lead Searchers Back to the Men They Find

Group of Box Kites Used to Lift Man above Field for Observation Purposes

GIVING SIDE LIGHTS ON WAR IN THE WEST

Portable Sheet-Metal Shelters for Workers Employed in Making Wire Protections against Grenades

German Ammunition Captured by French during Offensive in Champagne District



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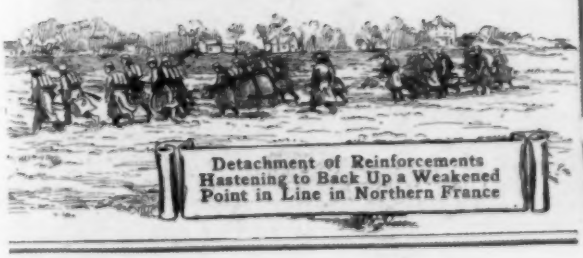
Subterranean Sleeping Quarters of French Soldiers on Western Front

Wooden Mortar and Dummy Artillerymen Divert Airmen from Real Battery: By Pulling Cords Distant Soldier Moves Figures and Causes Smoke to Issue from Gun on Approach of Scout



Detachment of Reinforcements Hastening to Back Up a Weakened Point in Line in Northern France

GERMANS USING POISON GAS AGAINST RUSSIANS

One of the Newest Phases of Warfare, the Use of Poison Gas, is Shown in This Remarkable Photograph Taken in the Eastern Theater by a Russian Airman. The Clouds of Asphyxiating Fumes Released from Chlorine Cylinders are being Carried by the Wind into the Russian Trenches from a German Position. At the Right Three Lines of Troops may be Seen Waiting in Formation to Follow Up the Attack. The Men Scattered before Them are Attending the Gas Cylinders

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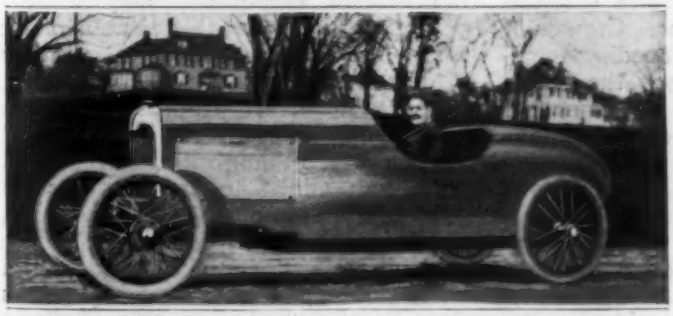
PRODUCE MARKET IS ROOFED OVER BY CITY

The proper marketing of fresh vegetables, fruits, and other farm produce, is becoming a problem of some importance to cities. When weather conditions are good, open-air selling from the wagon is the cheapest and usually the most satisfactory method. In inclement weather, however, but few patrons will brave the elements to make their selections, preferring rather to go to the various stores and there pay the additional percentage of cost the increased handling makes necessary. For a number of years past the city of Pittsburgh allowed farm wagons to congregate on the river wharves in all weathers and dispose of their products as best they could. Realizing the inefficiency and numerous shortcomings of this plan, a large roofed-over area has been provided especially for their benefit. A cement walk down the center provides a vantage point from which customers may view the wagon stocks with ease. Between 75 and 100 wagons may be sheltered beneath the structure, safe from weather interferences or the crowding of city traffic.

City Market is Roofed Over for Convenience of the Wagon Merchants and Their Customers

SMALL SPEEDY MOTOR CAR HAS NOVEL FEATURES

A small car designed for fast touring and speed contests, which in certain points of construction resembles an aeroplane, has been put on the market. The body is built in combination with the chassis, the whole being a single streamline shell resembling that of certain aeroplane types. Thin wooden strips, laid diagonally and covered with canvas, form the body. Power is furnished by a small four-cylinder, water-cooled engine with three forward speeds transmitted by a bevel-gear drive. Steering is accomplished by means of a steel cable running over a drum, the front axle swiveling about a central pivot which combines in its construction the front spring and shock-absorbing device. The rear springs are of cantilever type, and, like practically all the mechanism, are completely inclosed in the streamline body. The seat is less than 12 inches from the ground.



The Streamline Body of This Small Speedy Car Is of Wood Covered with Canvas, and is Built in Combination with the Chassis

SCIENTISTS SUBDUE ECHOES IN SPITE OF DIFFICULTIES

Scientists who recently completed an investigation into the subject of architectural acoustics at Harvard University had a varied experience. The work was undertaken because of the prevailing lack of data and general knowledge as to why many auditoriums and assembly halls have such poor acoustical properties. Because of these, speakers find it difficult to make themselves understood above a din of echoes and reverberations. As a result of the research it was definitely established that this seemingly intangible, abstract subject could be reduced to a series of perfectly definite propositions, a knowledge of which would enable an architect to avoid poor acoustical properties even in the initial designing of a hall. The work proceeded with scientific accuracy and close attention to minute detail. It proved, however, to be far from a prosy proceeding.

At the beginning of the research a troublesome lecture room in the university itself was the main object of investigation. Using an organ pipe as a source of sound, initial operations consisted simply in determining how long a given note would reverberate with the room entirely empty. By means of suitable instruments, this period was found to be 5.62 seconds, an unusual length of time. Crowds of people being scarce, and needing something to deaden or absorb the sound for further experiment, the scientists resorted to lugging over chair cushions from a near-by theater. These were installed in the seats in place of people. Later additional cushions were laid in the aisles and at other available points. By such means the duration of audibility was reduced to 1.14 seconds, a remarkably short time considering the former figure. Then the cushions were removed and curtains of chenille, oriental rugs, cretonne cloth, canvas, and hair felt, successively substituted, and their effect compared with that of the theater cushions. All this involved work, and strenuous work, but by using the chair cushions as a basis for comparison in each case it was possible to secure absolute data.

As a check on previous operations, and undaunted by the amount of labor already expended, it was determined to get an actual audience together and experiment on them instead of inanimate chair cushions. A free lecture on wireless telegraphy attracted the desired number of people, who, at the conclusion of the talk, were induced to remain for the experiments immediately to follow.

Woe, however, attended the experimenters' efforts. A thunderstorm outside outclassed the attempts of those within to make a noise. The night being sultry, it was necessary to have the windows open, which proved a further ally of the thunderstorm. The combination proved too much for the audience, and it departed. Thus ended one of the more ludicrous incidents of the investigation. A later attempt was, however, more successful.

An effort some time afterward to determine the sound-absorbing powers of wood sheathing was productive of an additional interesting episode. To get a suitable room proved a difficult matter, and the entire city had to be searched before a place possessing the desired qualities could be located. The room chosen happened to adjoin a night-lunch emporium, and it was necessary to buy out this establishment for two nights in order to stop clatter of dishes and other disturbing sounds. Even then street traffic proved an annoyance, except for a brief period shortly after midnight. An occasional policeman added to the troubles by pounding peremptorily on the door, demanding to know the nature of the curious musical sounds coming from within. In spite of such interruptions the scientists eventually managed to secure data of considerable value.

By thus doing pioneer work as to how much sound the walls, ceiling, seats, audience, and other attributes of a lecture hall are capable of absorbing, the workers gave architects something tangible to go on in future designing.

NEW YORK TO HAVE MODEL MOTOR-BUS SYSTEM

All busses to be kept carefully clean, no advertising to be allowed, a seat to be provided for each passenger, additional busses to be installed whenever the city desires, in winter a 16-ft. path to be cleared off along its lines immediately after each snowstorm—such are some of the almost utopian promises New York City recently exacted in granting a franchise for a motor-bus line. The service is to supplement that already given by surface cars, and the city hopes in establishing the line materially to better transportation facilities about town. The busses used will resemble in some respects those now in use in London, but are to be improved by the addition of several American conveniences.

NEW "TEDDY" BEAR HAS ELECTRIC EYES

A new species of the popular "Teddy" bear has been placed on the market, the distinctive feature of which is electrically lighted eyes. These can be illuminated by pressing the chest of the toy. These eyes are in reality small bulbs similar to those in small pocket flash lights and can be replaced easily. A small dry-cell battery, which can be replaced also, is concealed in the toy and furnishes current for 5,000 flashes.

CANVAS VOTING BOOTHS USED IN CALIFORNIA

Considerable savings in election costs are made in Los Angeles County, California, by the use of portable canvas voting booths for precincts outside the most thickly populated sections. Each booth consists of one rectangular tent, or more, as circumstances require, and where more than one tent is used they are connected end to end. The tents are 20 ft. long and 12 ft. wide, and are equipped with collapsible frames, bottom sills, top plates, ridge poles, and rafters. No pegs or guy ropes are required. Along one side are stanchions about three feet apart carrying brackets that support the shelves used by the voters. The tents are delivered at the various sites by a motor truck, a few days before the election, and are usually erected on the public sidewalks.

One of the Portable Canvas Voting Booths Erected on a Sidewalk in Los Angeles

¶Manual-training pupils of a Glasgow industrial school have designed and made periscopes, provided with a device that eliminates the glitter of the sun on the exposed mirror, which have been approved by the British military authorities and distributed in large numbers in the trenches.

AMERICA'S LARGEST TREES FOUND DURING CONTEST

MUCH data of general interest and of considerable value to foresters has been collected as a result of a big-tree contest recently conducted by the American Genetic Association. Several hundred photographs and descriptions of large and unusual native trees in various parts of the country were submitted to the organization during the course of its competition, and through the information thus gathered a number of exceptional specimens of certain species have been "discovered." The contest embraced a search for the largest nut-bearing and non-nut-bearing trees in this country, excluding the gigantic Sequoias of the Pacific coast, which for size surpass all other trees in the world. What undoubtedly

This Is One of the Finest Yellow Poplar Trees in the Country and Undoubtedly the Largest Growing

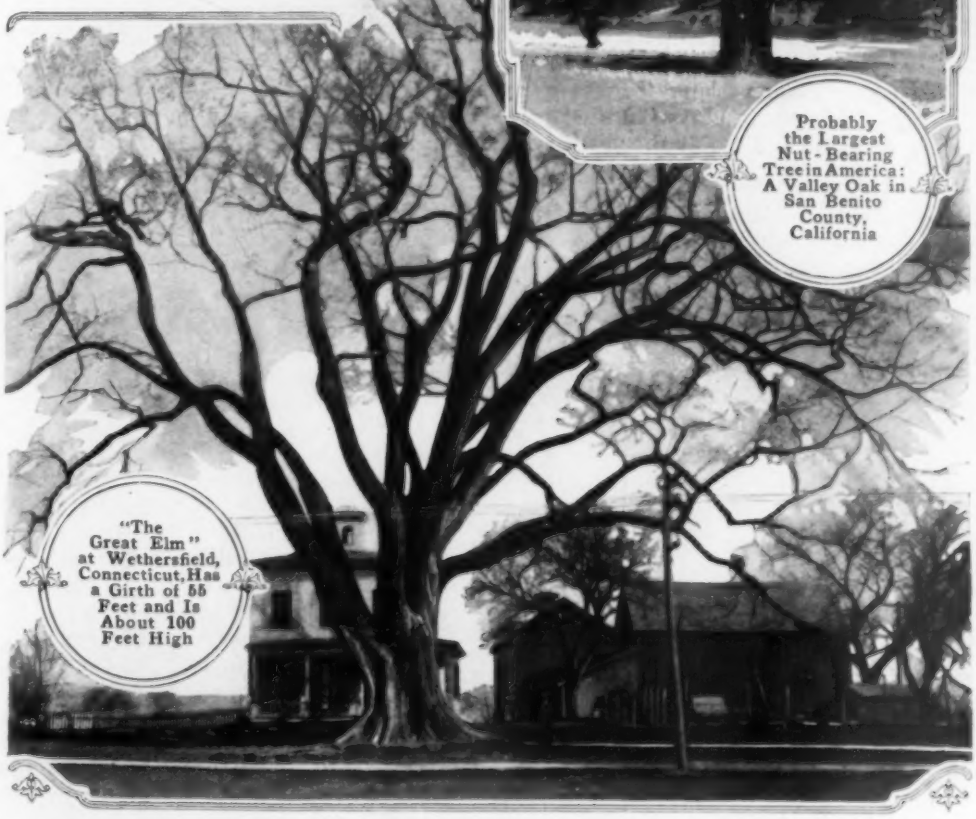
Exceptional Catalpa, 16 Feet in Circumference and 75 Feet in Height, Standing near Luxora, Arkansas

Here Is America's Largest Shade Tree. It Is an Indiana Sycamore with a Girth of More than 42 Feet

PHOTOS BY COURTESY OF THE AMERICAN GENETIC ASSOCIATION

is the largest deciduous tree now growing in the United States is a sycamore near Worthington, Ind., which at 5 ft. from the ground measures 42 ft. 3 in. in circumference. Its height is approximately 150 feet. According to local claims this remarkable specimen is inferior to one long since felled in the same district which had a girth of 67 ft. A valley oak which measures 37 ft. 6 in. in circumference was the largest nut-bearing tree found during the contest. This is situated in San Benito County, Cal., and reaches to a height of 125 ft. In a good season it bears a ton of acorns. America's largest elm seems to be "The Great Elm" at Wethersfield, Conn., which at the base has a circumference of over 55 feet. It is supposed to be about 250 years old. Next to the valley oak found in California, the largest nut-bearing tree uncovered is a chestnut near

Probably the Largest Nut-Bearing Tree in America: A Valley Oak in San Benito County, California

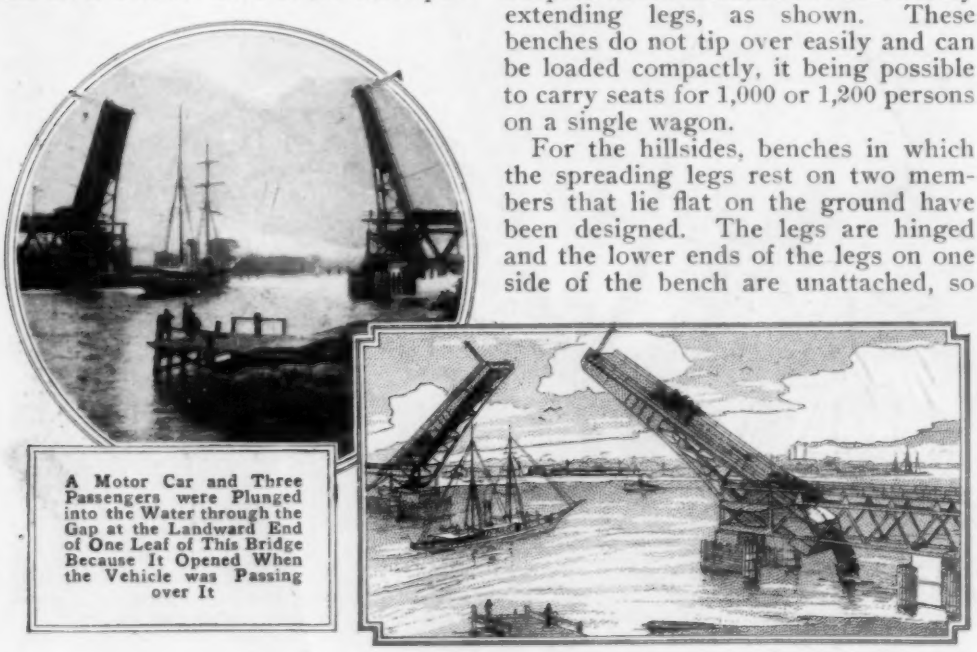


"The Great Elm" at Wethersfield, Connecticut, Has a Girth of 55 Feet and Is About 100 Feet High

Crestmont, N. C., which measures 33 ft. 4 in. in circumference at 7 ft. above the ground. Many other trees almost as interesting as these were brought to light. Among them are splendid specimens of the persimmon, holly, sassafras, catalpa, and white-birch trees. In commenting upon the two prize-winning trees, the California oak and the Indiana sycamore, the forest service draws attention to the desirability of planting the latter for shade purposes in cities because of its rapid growth and peculiar ability to withstand the effects of smoke and gases. It points also to the fact that, while very beautiful, the valley oak is not adapted to this field because it requires from 300 to 400 years to attain maturity.

UNUSUAL MOTOR ACCIDENT WHEN BRIDGE OPENS

An unsual motor-car accident occurred recently on a bridge spanning the Cape Cod Canal at Sagamore, Mass., when a car with three passengers attempted to cross the bridge just as the draws began to rise so that a boat could pass beneath. The steep incline of the span on which the car was moving caused the car to roll backward. The leaves of the bridge are so pivoted that when they stand at an angle of about 45° there is a gap between their landward ends and the approaches to the bridge. Through one of these gaps the car and its occupants plunged into the river below. Two of the three persons were rescued, the third being carried away by the swift current and drowned. The accident took place at night during a snowstorm.

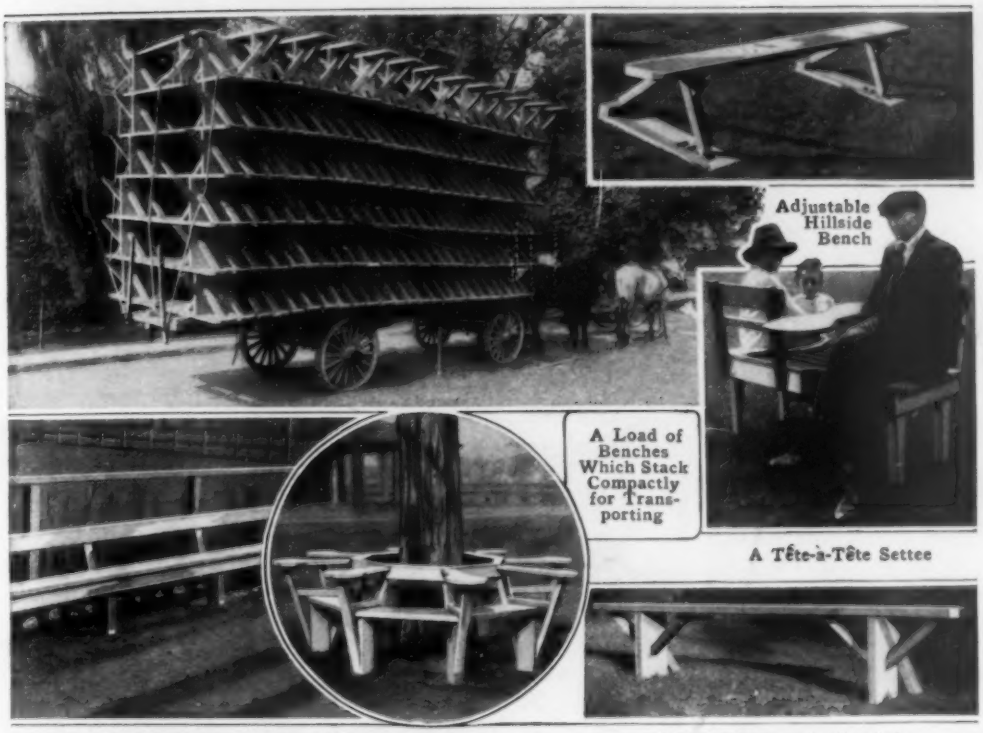


A Motor Car and Three Passengers were Plunged into the Water through the Gap at the Landward End of One Leaf of This Bridge Because It Opened When the Vehicle was Passing over It

PARK SEATS OF SEVERAL SERVICEABLE DESIGNS

Outdoor seats of several unusual and serviceable designs have been constructed for the parks of Hartford, Conn. Among those most used are benches for band concerts. As these musical programs are given in one park and then another it was desirable to have seats that can be easily transported from place to place. After much experimenting, a design was adopted which included two rearwardly extending legs, as shown. These benches do not tip over easily and can be loaded compactly, it being possible to carry seats for 1,000 or 1,200 persons on a single wagon.

For the hillsides, benches in which the spreading legs rest on two members that lie flat on the ground have been designed. The legs are hinged and the lower ends of the legs on one side of the bench are unattached, so



Fence Bench: The Second Rail Forms the Back Rest

Octagonal Seats with Broad Arms

Bench That can be Loaded Compactly

that these ends can be placed in various notches in the upper side of the pieces which rest on the ground. By this means the seat can be made level regardless of the slope of the hillside. The flat members also act as a protection to the grass. This bench can be folded into small space.

About many of the trees artistic octagonal seats have been built with broad arms on which luncheon can be spread. A tête-à-tête settee with a broad arm extending through the middle can be used in the same manner. Along some 2,000 feet of fence benches have been built of such a design that the second fence rail constitutes a back rest, and the posts act as the rear supports for the seat.

¶Only those whose homes are unequipped with electric or gas-lighting facilities, or who need the product in order to earn a living, are now permitted to use petroleum in Germany, according to recent advices.

CLEVER SEED DISPLAY ATTRACTS TRADE

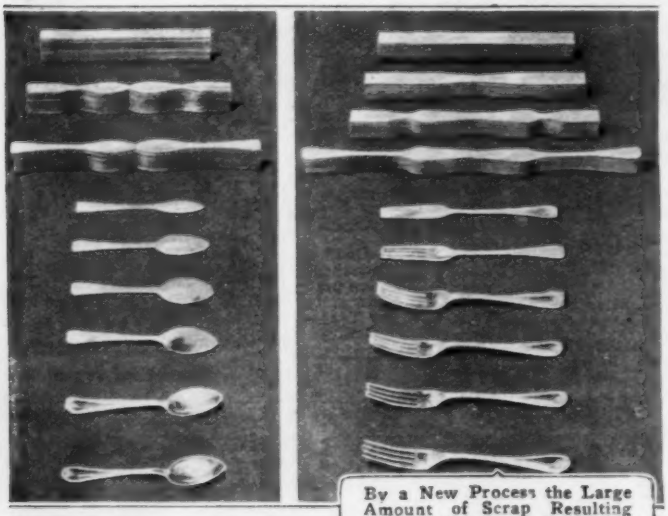
An effective display, used by a western merchant to announce the fact that he had installed a line of seeds as part of his stock, was composed of seeds of various kinds and colors so arranged on the floor of the display window as to spell the word "seeds" and form a border and geometric de-

Seeds of Many Colors Arranged in Geometric Designs Prove Business Getters for Western Merchant

signs. Each figure or letter was composed of seeds of one kind and color. The display attracted a great deal of trade.

NEW PROCESS FOR MAKING FORKS AND SPOONS

A process which greatly reduces the amount of scrap obtained in the manufacture of spoons, forks, and other flatware has been developed in France. With the usual methods in such manufacture the scrap is from 40 to 45 per cent of the original metal used. The new method reduces the amount of scrap to five or six per cent. It is essentially cold-drawing and coining under heavy pressure; sterling silver, German silver, steel, and aluminum being metals used. The tools are simple, easily adjusted, and quickly changed or replaced; the amount of labor involved is comparatively small.



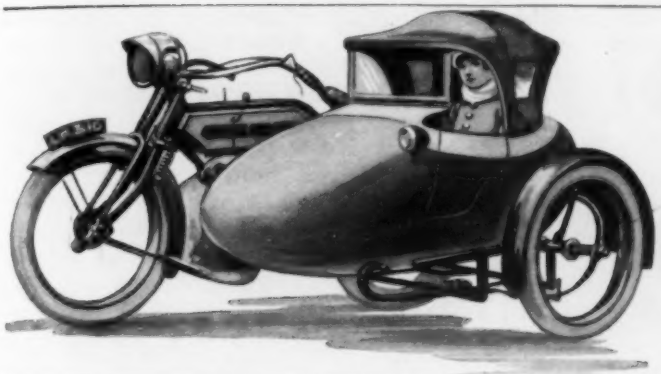
By a New Process the Large Amount of Scrap Resulting from the Making of Blanks for Flatware is Almost Entirely Eliminated

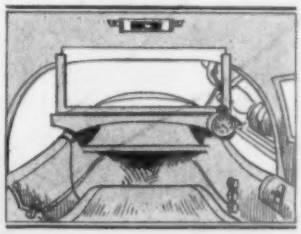
By the usual American method finished blanks for forks, spoons, etc., are cut from pieces which have been enlarged by rolling. To cut a finished blank of the desired form from such material makes unavoidable a large amount of waste, or scrap. By the new process the original strips of metal used contain very little metal in excess of the amount needed in the articles to be made. At a considerable saving of labor "double blanks"—strips sufficient to make two articles—are usually used. From 8 to 18 of these double blanks, according to size, are assembled in a bundle, or "package," and placed on edge in a quadruple-expansion profiling press. From four sides they are subjected to a pressure of from 150 to 250 tons for the purpose of giving each blank a profile somewhat like the article into which it is to be made. This pressure does not change the thickness of the blank but causes the metal to flow longitudinally, at the same time removing pores and other defects.

For spoons, two profiling operations, with one change of dies, are required; for forks, three operations with two changes of dies. So accurately can these operations be performed, that the blank needs only a very little trimming to make it into the desired shape. The remaining processes include additional shaping of the ends, flat polishing, stem upsetting, embossing, trimming off the flash, or thin edge, of scrap, and the final polishing.

FLOWER BOX AERATES AND WATERS PLANTS

Water spilling out of flowerpots and plant boxes is a continual source of annoyance to the housewife. With a view of lessening this trouble a new type of plant container has been invented. It consists of a metal box of the desired size, shape, and finish, in the bottom of which a flat tank is placed. A pipe from the upper surface of the box leads down to





Besides Being Neat and Attractive in Appearance, the Sidecar Is Roomy and Comfortable

this tank, and through it water may be poured even after the rest of the box has been filled with soil. Filling the tank occasionally is all that is necessary to supply water to plants growing in the boxes, as a wicklike, or nozzle, arrangement leads up from the tank into the soil, permitting water to work gradually up to the roots. Corrugated linings of porous clay or cypress wood may also be placed in the boxes to assist in the circulation of moisture and in aeration processes. Since the porous nature of the linings causes water to be absorbed, additional moisture, along with air, is made to go into the soil to supplant that taken up.

LUXURIOUS SIDECAR BUILT FOR MOTORCYCLE

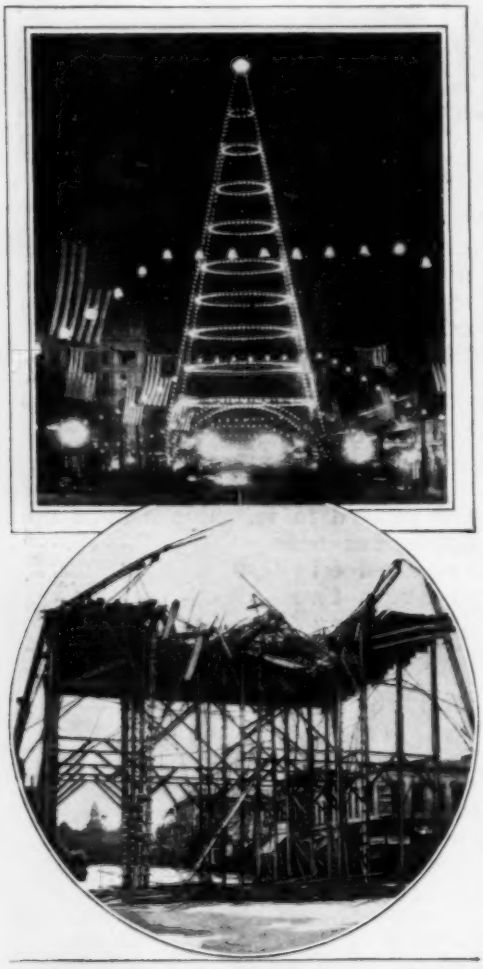
One of the neatest and best appointed sidecars so far designed for use with motorcycles has been introduced in England. Its streamline body is finished in black and white, well upholstered inside and covered by a very shapely top which is held in position by elbow struts. A glass windshield protects its occupant from the rain and cold, while small windows at the sides admit light during the daytime and give a broad scope of vision. A bullet-shaped headlamp is mounted on the left side, while the interior is fitted with an overhead electric light and supplied with a small clock. At the rear is a roomy compartment in which tools and small packages may be carried. The finish and workmanship are especially good throughout. Although no objection would perhaps be found to it on paved streets, the clearance of certain parts of the chassis is very slight, being only 2 in. from the ground.

DAIRY'S WATER TOWER ADVERTISES MILK

A water tank, 32½ ft. high, shaped and painted to resemble a huge milk bottle, has been erected high above a Canadian dairy to serve as an advertisement and for fire protection. The "bottle" is constructed of quarter-inch boiler iron and stands on a tower 75 ft. high; its diameter at the bottom is 13 ft. and at the top 6½ ft. The tank has a capacity of over 25,000 gallons, and the combined weight of the tower and tank when filled is 236,000 lb. The cost of erecting this striking tower was slightly more than for the ordinary type.

OLD STEEL TOWER FELLED BY FIERCE GALE

A terrific gale recently demolished a 265-ft. steel tower which had stood as a conspicuous landmark in San Jose,



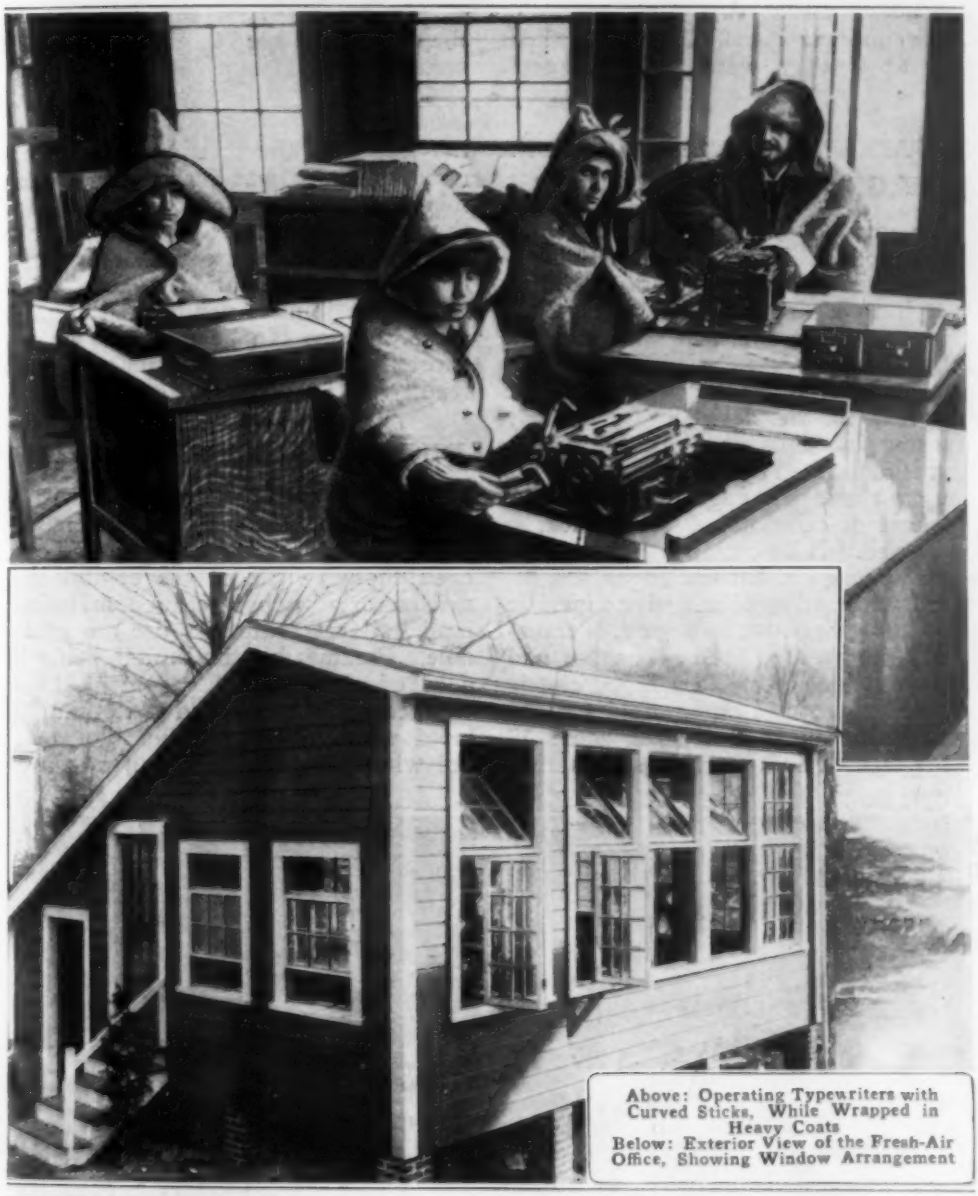
Above: San Jose's Steel Tower, 265 Feet High, As It Appeared at Night Before It was Destroyed.
Below: Wreckage of the Tower After a 57-Mile Gale Swept the City

Cal., since 1881. Engineers estimated that a 60-mile gale would subject each of the corner supports to a pressure of 23 tons. The tower withstood for five minutes a wind blowing at the rate of 57 miles an hour, but a little later, when the wind had subsided to 51 miles per hour, it collapsed. Careful examination after the storm showed that the hollow steel tubes constituting a part of the structure had crystallized. It is believed that this was due to constant vibration caused by traffic in the streets beneath. Less than a year before this recent storm a fierce gale bent and wrenched the tower. At that time $5,000 was raised by public subscription to repair it. Two expert examinations of the structure were made, one four months and one a few weeks before it fell. On both occasions broken parts were discovered, leading engineers to conclude that the tower's strength was deteriorating. It was built as a part of a method of street illumination now abandoned. In recent years it had served ornamental purposes only, being adorned with thousands of incandescent lights, and had been a conspicuous decorative feature on many occasions.

ITALIAN SCHOOL CHILDREN FORM INSURANCE BODY

In the interest of the pupils a mutual-benefit system of insurance has been inaugurated in the elementary schools at Rome and also in those of a few other Italian cities. Although still comparatively new the plan is growing very rapidly and has been received so favorably by the government that action has been taken authorizing the introduction of the idea into the state schools and bringing it there under state supervision. The pupils contribute a small weekly fee to a general fund from which sick, accident, and death claims are paid. The fund simultaneously lays a foundation for old-age benefits, and it is hoped to encourage the children to continue their payments after leaving school and until reaching maturity. The scheme is considered to have a valuable psychological effect upon the child at its most impressionable age. Among the lower classes, it is thought, this effect undoubtedly will be felt also in the home, for the parents in giving a child money with which to pay its insurance premiums are continually presented with the thought of providing for the future.

FRESH-AIR OFFICE OCCUPIED DURING COLD WEATHER



Above: Operating Typewriters with Curved Sticks, While Wrapped in Heavy Coats
Below: Exterior View of the Fresh-Air Office, Showing Window Arrangement

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At Wellesley Hills, Mass., a prominent statistician and writer has established an open-air office in which he and his immediate assistants do their work. It is virtually a fresh-air parlor and consists of a frame building provided with numerous windows which during the daytime are thrown wide open, irrespective of the outside temperature. During the winter everyone engaged in the office wears a heavy woolen coat and mittens. In order that the stenographic force may be able to operate the typewriters with gloved

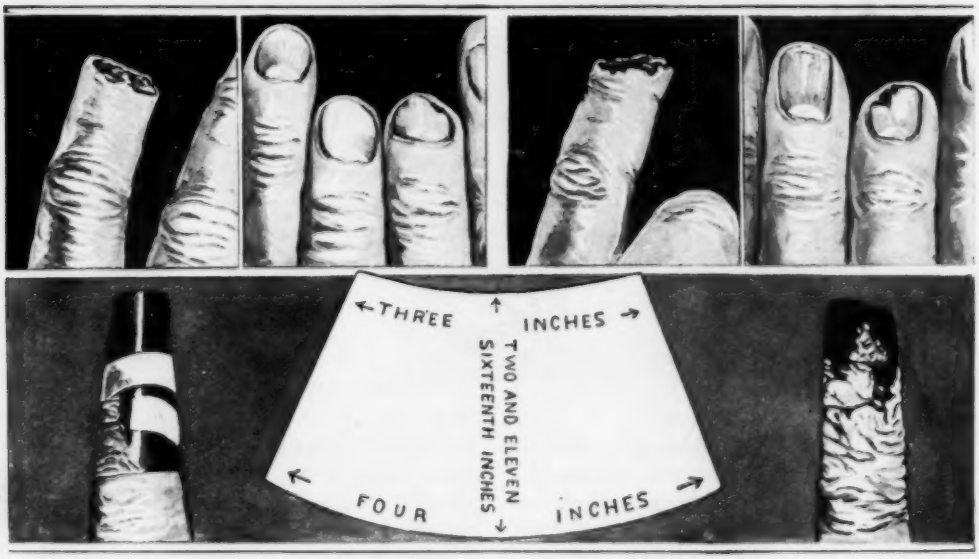
hands, small, curved sticks are employed instead of the fingers in striking the keys. Each typist uses a pair of these implements, hitting with them just as if they were tack hammers. While it is obvious that correspondence is turned out comparatively slowly in this way, the members of the office force keep in good health and mental trim.

REPAIRING MAIMED FINGERS BY GROWING NEW TISSUE

By making use of a tapering celluloid tube, a Baltimore surgeon has accomplished interesting work in adding length to a finger after the terminal phalanx, or tip end, has been accidentally amputated. The treatment consists of stimulating granulation tissue to grow in the desired direction by training it. This phase of the operation is facilitated by the tube, which fits snugly about the edge of the wound. A sheet of celluloid, .005 in. thick, is employed. It is cut to a certain pattern, wrapped about the finger and secured with strips of adhesive tape. It does not adhere to the wound, is transparent, and serves both as a splint and guard. When possible a blood clot is allowed to form as a scaffold for the granulations. A review of some 15 cases treated in this way shows that the length of the soft part of the terminal phalanx was increased in each instance, while in a fourth of the cases the bone grew slightly. Furthermore the stumps healed so that they were not painful to the patients. It is stated that if the joint is not injured a small piece of bone can be made to form a shortened phalanx which may be used readily.

DUTCH GUIANA PAVES WITH GOLD QUARTZ

In Dutch Guiana a satisfactory method of paving has been worked out, even though little of the capital and satisfactory construction materials road builders ordinarily use are available. Paramaribo, the capital, being in need of a stretch of pavement, local engineers set out to find something to build with. The only suitable material within reasonable distance proved



COURTESY JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION

Top: Mangled Fingers before and after Treatment. Below: Tube in Place, and Removed Showing Line of Amputation. The Tube Fits Snugly about Wound and Permits New Tissue to Grow in Desired Direction

Paving Streets of Paramaribo, Capital of Dutch Guiana, with Quartz; Native Women and Men Who Pound Up the Rock Sometimes Find Valuable Gold Nuggets

to be quartz, a mineral glassy in appearance and almost as hard as diamond. To get this to the city entailed an expense of $2 per ton. No rock-crushing machinery being available, the quartz was dumped at convenient intervals along the street, and natives hired to break it up piece by piece with small hammers. The women and youngsters took particular interest in this employment, squatting in the dust and hot sun and pounding lustily for 12 hours at a stretch. Though receiving but 50 cents a day for such work, individuals sometimes added to their earnings by finds of gold in the bits of quartz. Cases are on record of an occasional dusky lady accumulating as much as $150 in this way in six weeks' time.

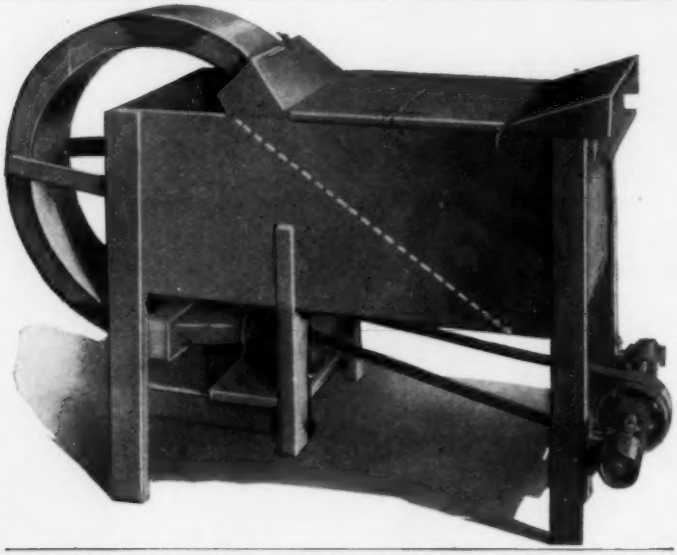
TABLE SERVES TWOFOLD PURPOSE

In flats and apartment buildings economy of space is important. For this reason combination furniture is frequently purchased for such places. One of the latest developments in the combination line consists of a table designed to serve both for dining purposes and for library use. This is made possible through the fact that the top is equipped with concealed leaves which may be folded out to give the larger area necessary for a dining table. A hidden lever beneath the leaves controls the folding functions. When the extra leaves are beneath the regular top, and the latter closed down, the table appears no different from the ordinary library type.

Convertible Table Serves Both for Library and Dining Room

BLOWER SOFTENS HARD SEEDS FOR PLANTING

Certain seeds, such as sweet clover, burr clover, vetch, and alfalfa, have hard brittle coverings almost impervious to water. Farmers sometimes experience considerable difficulty in getting these to germinate promptly, causing, as a result, a poor stand in the hay crop derived therefrom. To get these seeds into shape before planting, an experiment station conducted by the Iowa State Agricultural College, at Ames, Ia., has recently constructed a mechanical scarifier capable of breaking or scratching each seed to such extent that water will find ready entrance upon planting, thus starting germination.

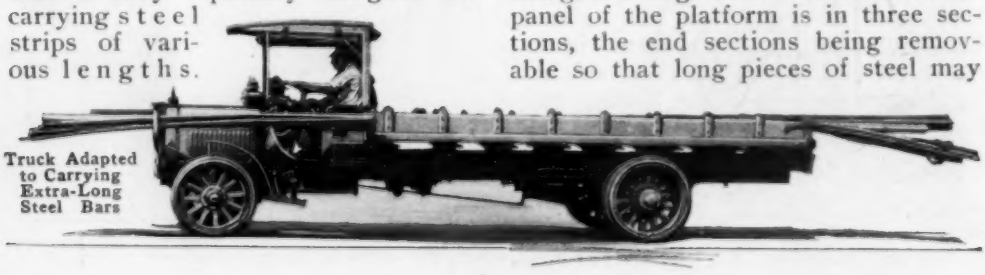


This Machine Scratches Hard-Coated Seeds by Hurling Them Against Sandpaper. With Their Covering Broken Such Seeds Germinate More Quickly

The new contrivance much resembles a washing machine in external appearance, or perhaps the fanning mill familiar to every farmer. The seeds to be scarified are poured in at one end, caught by a fan revolving at a rapid rate and hurled around a circular pathway lined with sandpaper. The result is that they emerge from the upper end considerably scratched up and rough-handled in general. Falling upon a screen at the end of the circular pathway, their velocity rapidly lessens, until, at the end of the screen, they tumble into a basket ready to go to the seeder out in the field. The machine will handle 30 to 40 bushels of unhulled seed per hour, or about 20 bushels of the hulled variety. Seeds run through this machine have given some wonderful yields.

TRUCK DESIGNED TO CARRY LONG STEEL STRIPS

A large steel company has recently added to its equipment a motor truck with a body especially designed for carrying steel strips of various lengths. The platform body of this truck is 16 ft. long. The sills are of heavy oak faced with steel. At either side are removable panels, 10 in. high and bound on the top with angle iron. The end gate swings down. The front cross panel of the platform is in three sections, the end sections being removable so that long pieces of steel may



Truck Adapted to Carrying Extra-Long Steel Bars

be laid on the platform and allowed to extend forward either side of the driver's seat. Attached to the bumper at either side are cradles, or brackets,

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Lifting One of the Horses from River by Means of Block and Tackle. This Picture Gives an Idea of the Great Difficulty under Which the Rescuers Worked

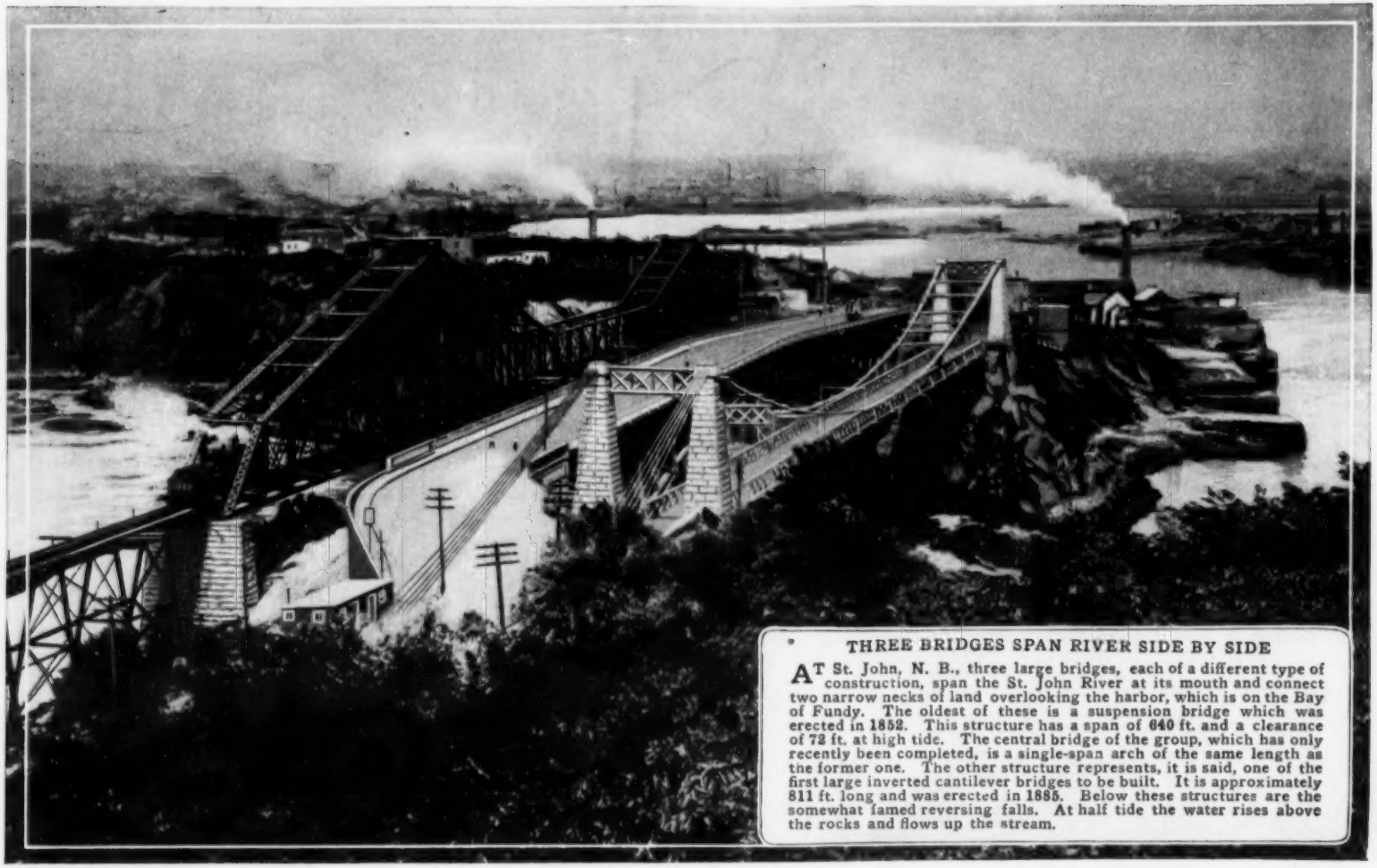
which carry a demountable cross bar for supporting the forward ends of very long strips of steel. Two rows of extra standards are fitted in the platform to aid in holding a load securely. The platform with the brackets furnishes a supporting length of 23 ft. and over.

BARGE LOADED WITH HORSES SINKS IN HUDSON RIVER

More than 500 horses consigned to the French government for war purposes were recently drowned in the Hudson River at New York when a barge, from which they were being transferred to the steamship "Anglo-Californian," listed to port and suddenly sank without warning. The affair happened at the same spot where the steamer "Craigside," loaded with sugar for the allies, was burned last

Attempting to Revive One of the Animals Pulled from the Water after Long Exposure

summer. This coincidence, coupled with peculiar circumstances surrounding the sinking of the lighter, gave rise to a belief that the animals perished as the result of the activities of alien plotters. The barge was a remodeled freight-car float which had been roofed and boxed in. According to reports, 300 horses were carried on the first tier and 320 on the upper one; both being below the deck. Some of those on the top tier managed to keep their heads above the icy water for several hours, while scores of men worked with derricks and pulled them one by one through a hole cut in the roof of the barge. The beasts imprisoned beneath, however, had no chance whatever of rescue. When the workers succeeded in slipping a wide canvas belt about the body of an animal and putting a rope about its neck, it was drawn from the water. Only three horses were rescued in this manner, however, during the first two hours, and the total number saved was very small.

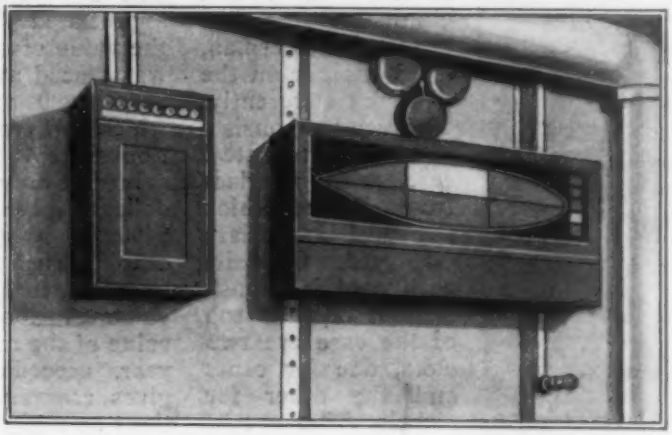


THREE BRIDGES SPAN RIVER SIDE BY SIDE

AT St. John, N. B., three large bridges, each of a different type of construction, span the St. John River at its mouth and connect two narrow necks of land overlooking the harbor, which is on the Bay of Fundy. The oldest of these is a suspension bridge which was erected in 1852. This structure has a span of 640 ft. and a clearance of 72 ft. at high tide. The central bridge of the group, which has only recently been completed, is a single-span arch of the same length as the former one. The other structure represents, it is said, one of the first large inverted cantilever bridges to be built. It is approximately 811 ft. long and was erected in 1885. Below these structures are the somewhat famed reversing falls. At half tide the water rises above the rocks and flows up the stream.

COMPRESSED AIR ACTUATES NEW TYPE OF FIRE ALARM

A recently marketed automatic fire alarm applies a well-known principle in an unusual way. A long metal tube about 1/40 in. in internal diameter is placed around the upper part of a room back of the picture molding or other convenient support. Should a fire break out, the increased temperature of the room at once expands the air imprisoned within the tube and pushes out a thin metal diaphragm in a special detector instrument mounted at one end of the pipe line. The diaphragm in expanding makes an electrical contact which rings an electric bell or turns on a light in an annunciator, thus giving the alarm. A regulating valve is mounted on the end of the tube not occupied by the detector. This valve allows such minute quantities of air to enter or leave the tube as may be required by ordinary temperature changes within the room. A pump set up in connection with the valve permits an occasional injection of compressed air, that the pipe line and its proper operation may be tested. The system has been installed in a number of notable buildings in the country.



An Automatic Fire Alarm Operated by Compressed Air: The Device is Connected with a Small Air-Filled Tube, the Contents of Which Expand Under Heat and Set Off a Gong or Turn On a Light

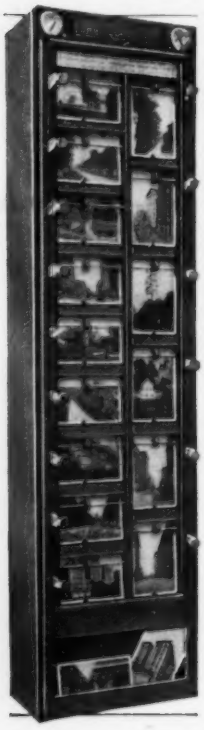
IMPROVISED STAMP MILL DOES EFFECTIVE WORK

An old upright boiler, a pump, and an air drill proved of substantial aid to a prospector engaged in working an unexpected find of gold-bearing ore recently. The vein was rich but too small to warrant the purchase of elaborate equipment, and with the exercise of ingenuity the improvised stamping and washing machinery served excellently. By mounting the air drill in a frame and fitting its piston with a shoe, as much as a ton of ore per day could be crushed in the small mortar rigged up beneath. The rapid hammering of the shoe crushed the ore to a fine powder, and the bits of gold were easily removed by amalgamation.

Curious Stamping Mill Which Paid Large Dividends: Old Boiler and an Air Drill Used to Crush Gold-Bearing Ore

AUTOMATIC POST-CARD VENDER

A mechanical post-card vender which displays 15 post cards at once, prevents handling and soiling of the cards, and eliminates the expense of a salesman, has been put on the market recently. The vender consists of a tall, narrow steel case with a glass front, behind which the post cards are displayed. Opposite each card is a push button. At the top of the case are two slots, one for cents and the other for nickels. After a customer has made his selection he deposits a cent or nickel in the proper slot. If it is the former the mechanism permits him to push any button once, after which the button locks automatically; if a five-cent piece has been inserted he may have six "pushes" distributed among the buttons as he sees fit, each button controlling the card nearest it. The cards selected drop to an open receptacle. Adjustments of the mechanism to correspond to other prices can be made easily.



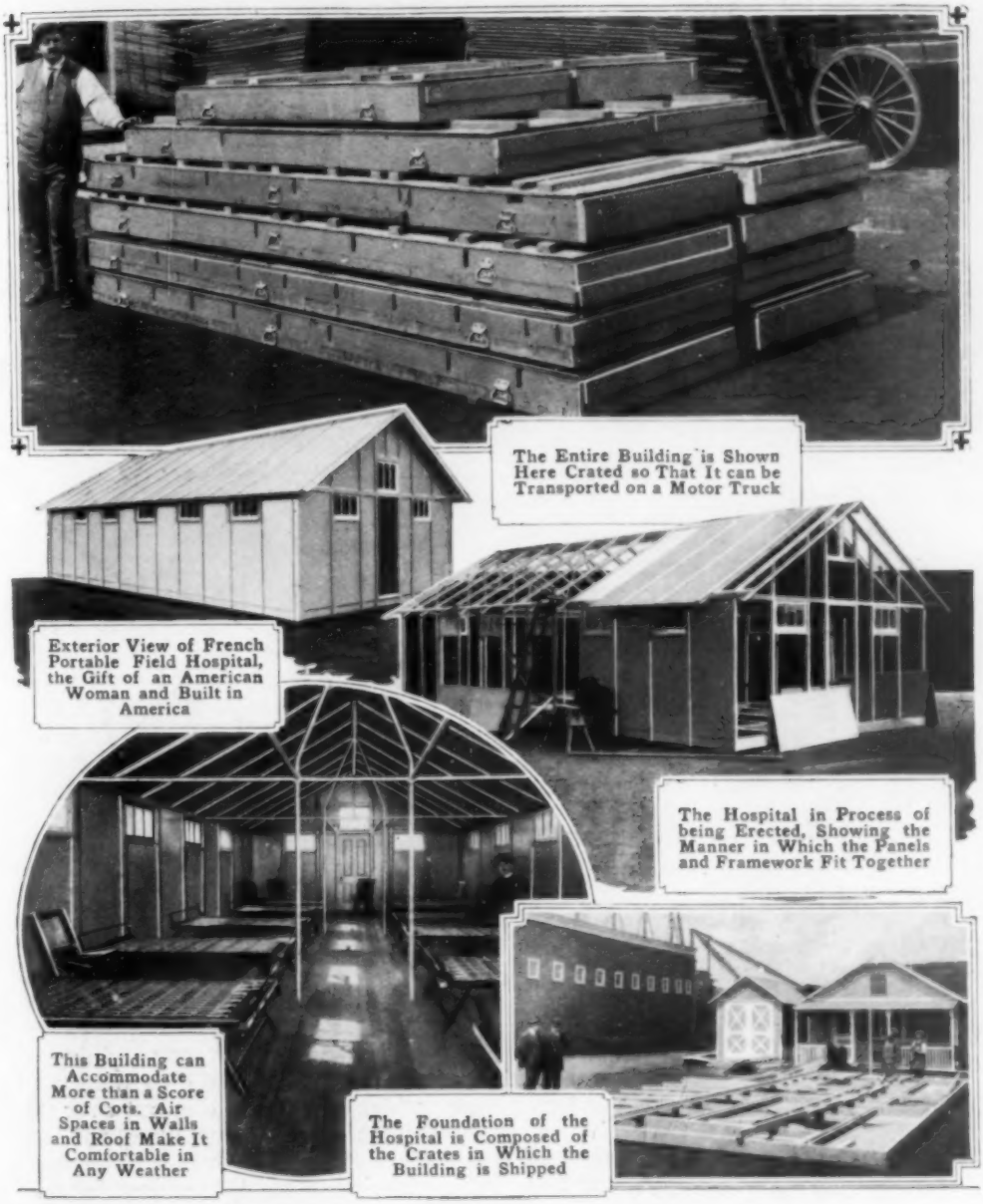
ALASKAN MINING INDUSTRY HAS PRODUCTIVE YEAR

According to preliminary estimates prepared by the Geological Survey, the year just ended proved to be the most productive twelve months thus far experienced by the Alaskan mining industry. The value of the total mineral output for the period exceeded that of 1914 by more than $12,000,000. An unusual amount of copper was produced, and this was largely responsible for the big showing. The aggregate output of all minerals is estimated to have been $32,000,000 as compared with $19,064,963 for the previous year. Of this amount approximately $14,400,000 was derived from copper alone. The significance of this may best be appreciated when it is remembered that the value of copper mined during 1914 was placed at only $2,852,934. About $16,900,000 of gold was also mined, which represents the greatest production since 1912 when the output was valued at only a few hundred thousand dollars more. Silver worth about $400,000 was produced, while other outputs, such as tin, antimony, marble, gypsum, coal, and petroleum, had a value of about $300,000. The high value of the mineral production for the year, according to the government, gives assurances of continued operations on a big scale in both copper and gold. The showing is not looked upon as a temporary expansion due to the present high price of copper.

ELECTRIC TORCH MAKES USEFUL HOUSE LIGHT

A few years ago small house lamps operated by batteries were expensive and unsatisfactory because of the large amount of current consumed by carbon filaments. The advent of tungsten, however, has changed this. Sharply in contrast with the older impracticality, a line of small electric lamps is now being manufactured, which may serve admirably and economically to illuminate dining tables, clocks, or in a variety of household ways. They are made up to resemble candles—with the battery where wax or tallow ordinarily is. A push button at the top turns the light on or off.

FIELD HOSPITAL CAN BE COMPACTLY CRATED



The Entire Building is Shown Here Crated so That It can be Transported on a Motor Truck

Exterior View of French Portable Field Hospital, the Gift of an American Woman and Built in America

The Hospital in Process of being Erected, Showing the Manner in Which the Panels and Framework Fit Together

This Building can Accommodate More than a Score of Cots. Air Spaces in Walls and Roof Make It Comfortable in Any Weather

The Foundation of the Hospital is Composed of the Crates in Which the Building is Shipped

A portable field hospital which can be erected by two men in about 90 minutes and when packed can be carried on a motor truck, is the gift of a New York woman to the French army. For its construction the United States government's portable houses for use in Panama and Alaska furnished suggestions. The structure is entirely of wood and indurated-fiber panels. Bolts are employed throughout instead of nails or screws.

A feature which contributes to the hospital's compactness when ready for

shipment is the use of the packing cases to form the foundation and floors. The tops of these cases are employed in constructing the roof. The building measures 17 ft. by 44 ft. and has a capacity for 26 cots and chairs and tables. It is lighted at the sides and ends by glass windows. The walls and roof have a 2-in. air space which, with the closely fitting joints, makes the building suitable for use in cold or warm weather.

All the material has been treated with a preparation which makes the building water and vermin-proof, as well as sanitary and fire-resisting. The building, with the necessary furnishings, is said to supply every requisite for the care of the sick and wounded in the immediate vicinity of a battle field. In it the urgent and essential preliminary ministrations to the suffering can be performed for large numbers before they are sent to permanent hospitals.

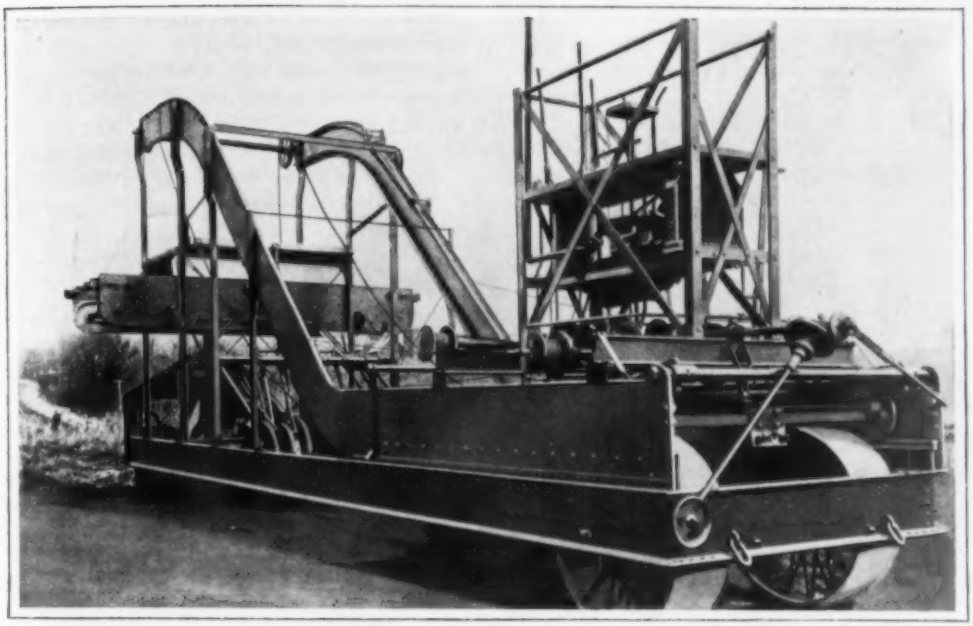
FIBER PLASTER BOARD MADE WITH ANCHOR BUTTONS

One of several advantages offered by a new plaster board, which is being utilized for both interior and exterior building purposes along the Pacific coast, is the ease with which it may be applied. It is readily cut either with a saw or hatchet, and may be nailed to a joist as securely as a pine lath. It is made of a fibrous material in sheets, 32 in. long, 24 in. wide, and 3/8 in. thick. What are termed composition buttons are set in depressions on one surface of the board. There are some 530 of these to a square yard, each supposed to be capable of supporting a 50-lb. weight without breaking, which in conjunction with the board itself make a good bond when plaster is applied. It is very rigid and when properly nailed in place will not sag. When employed on the exterior of a building which is to be finished in stucco, the board is covered with a loosely stretched wire netting, which serves as reinforcement.

DIRT-HANDLING MACHINE KEEPS WAGONS BUSY

An interesting machine for plowing up and loading dirt has been designed and built by a middle-western inventor. The machine finds special application in railroad-construction work, on irrigation ditches, and wherever large amounts of dirt have to be loaded onto wagons and transported a considerable distance.

The machine is pulled by a heavy traction engine. In use it advances about seven or eight feet at a time, tearing up the soil into seven wide furrows with a gang plow mounted at the front end. The machine then halts, and a scraper at the rear end, on which the loosened dirt has been accumulating, travels up an inclined track and deposits its load on a short crosswise conveyor. This runs the dirt out over the side of the machine and dumps it into a waiting wagon. Power for elevating the scraperful of dirt comes from a winding drum operated by the traction engine. The conveyor, however, is run by a small gasoline engine on the machine itself, the latter power also raising and lowering the plow, operating the steering mechanism, and performing other heavy duties of the kind about the contrivance. One man is re-



Machine Plows Up Dirt and Loads It into Wagons for Constructing Railroad Embankments and Such; It Is Capable of Delivering 80 or More Two-Yard Loads per Hour

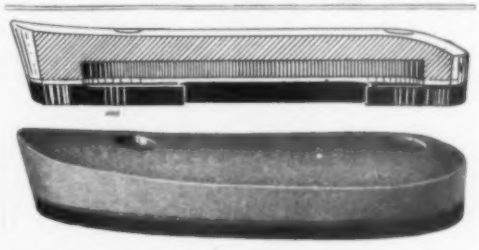
quired to operate this machine, and two on the traction engine. A complete wagon load of 2 cu. yd. can be delivered in 20 seconds, according to the builder, the average, however, being 80 to 100 loads per hour.

WARSHIPS' SEA CONTROL SHOWN IN COURT

Striking evidence of the effectiveness with which the warships of a dominating naval power can control the seas in time of war was given in the recent trial of a German official. One steamship line, according to admissions in court, paid out nearly a million and a half dollars for food, coal, and ship charters for 16 vessels. But the attempt to provision foreign sea raiders from United States ports by this means proved an expensive failure. Of all the ships sent out, only one reached the raiders and discharged its cargo. Immediately after this transfer of provisions, etc., had been made, the auxiliary cruiser that had received the supplies was attacked and sunk at the end of a two-hour naval battle.

IMPROVED GUN-RECOIL PAD FOR SPORTSMEN

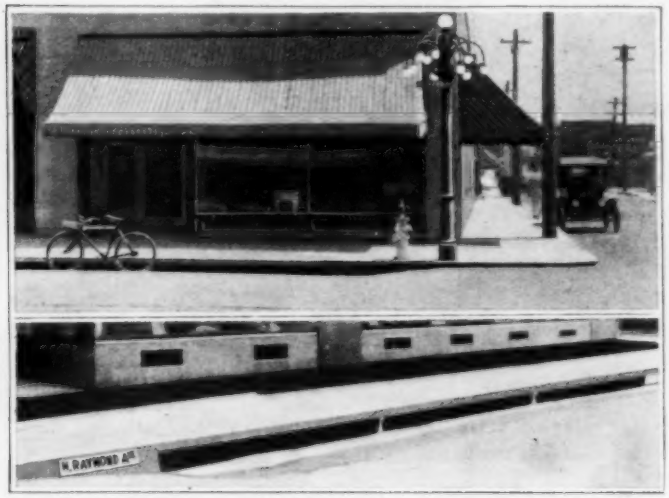
A gun-recoil pad which is said to possess qualities equaled by none other has as an important feature a long air chamber between a hard-rubber base and a soft-rubber cushion. These two parts are held together by a particularly strong adhesive strip which, it is said, will not give way. The long air chamber greatly increases the shock absorption, and sportsmen using this device will find that much, if not all, the discomfort occasioned by frequent discharge of firearms has been eliminated.



Large Air Chamber in This Recoil Pad Makes It an Effective Shock Absorber

WIDE STORM-WATER INTAKES PREVENT STREET FLOODS

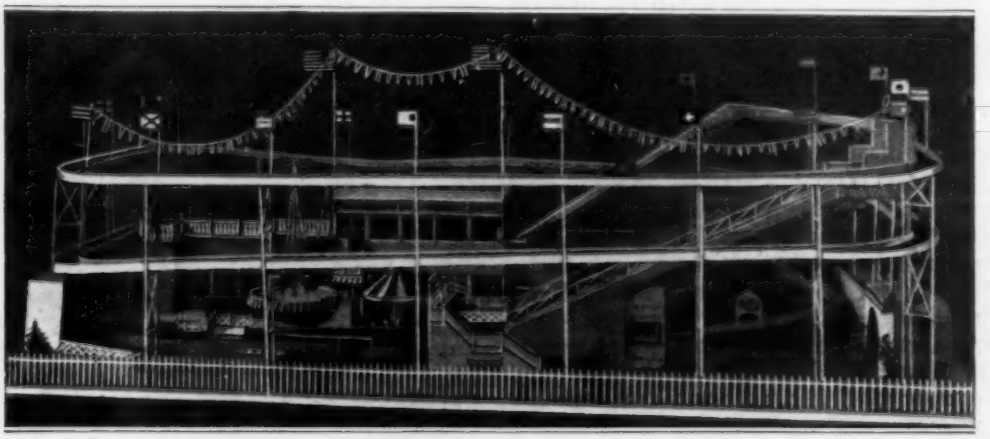
By constructing broad sewer intakes in the curbs adjacent to street intersections, the city engineer of Pasadena, Cal., has devised a very satisfactory method of handling great volumes of storm water and preventing the crossings from becoming flooded during heavy downpours. The openings are 30 ft. wide and 9 in. high, while the flow line of the guttering is lowered 3 in. At the end of the intake which is farthest from the street corner the difference in the levels is taken up in a rise 6 ft. in length. At the other extremity the gutter is elevated so that it is only 2 in. lower than the sidewalk level, thus providing a smooth and high crossing for pedestrians. That section of the sidewalk which is immediately over the intake consists of a 3-in. slab of reinforced concrete and is supported on a pair of steel struts placed about 10 feet apart.



Storm Sewers of Adequate Capacity and Large Intakes Keep Streets from being Flooded during Heavy Rains

MODEL AMUSEMENT PARK IS MADE FROM SCRAP PAPER

A pocketknife, a pair of scissors, and a one-foot rule were the only tools used in making a model amusement park which attracted considerable attention as a window display in a western city recently. Though built of such a flimsy material as scrap paper, with the help of occasional bits of pasteboard and glue, the model had a

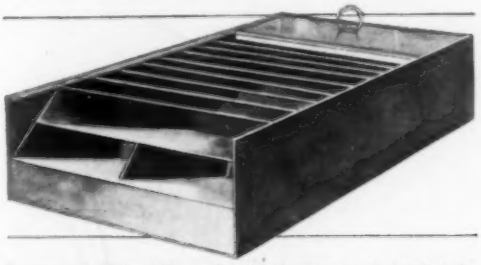


Model Amusement Park Made from Scrap Paper and Glue Which Attracted Attention as Window Display

full complement of the usual side shows and amusement devices, each running full blast as in a genuine park. These diversions included a scenic railway, a "shoot-the-chute," a "devil's slide," a merry-go-round, and a circle swing, all propelled by a small electric motor. Miniature electric lights illuminated the display, the whole affair proving a decided attraction to passing crowds.

STATIONERY FILE KEEPS ORDER IN DESK DRAWER

Designed to eliminate the trouble of hunting for writing materials, a metal file for holding letterheads, envelopes, and business stationery was recently invented. It is so shaped as to fit readily into a desk drawer, from which it may easily be removed for adjustment of contents or adding quantities



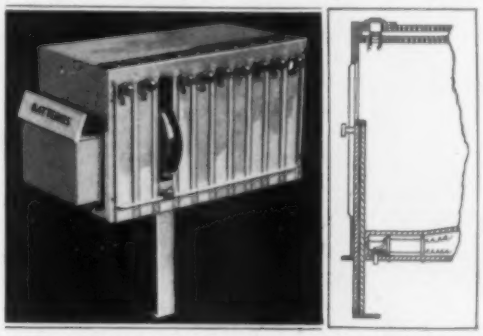
Stationery File Allows Ready Access to Letterheads When Wanted

of new material. A number of compartments are provided, each one on a slant, so that quick access to all filed stationery is possible. The principal joints in the device are electrically welded.

FIREPROOF FILM BOX HAS AUTOMATIC LOCK

A fireproof, self-locking film box, divided into compartments, each holding one reel of film, was recently invented for use in the projection booths of moving-picture theaters.

The idea in such a contrivance was to provide a safe storehouse for the films so that their highly inflammable nature might not endanger other objects within the booth. The box may be made with any desired number of compartments, the standard size, however, having eight. Each space is lined



Storage Case for Moving-Picture Films is Asbestos-Lined and Equipped with Electrically Interlocked Doors of Which Only One can be Opened at a Time

with asbestos and provided with a separate door controlled by an electrically operated lock. This is so made that only one door can be opened at a time, and then only when the other doors are tightly closed. A battery box at the side of the case provides current for operating the several locks.

MODERATE SPEED ASKED BY MOTORISTS' SIGN

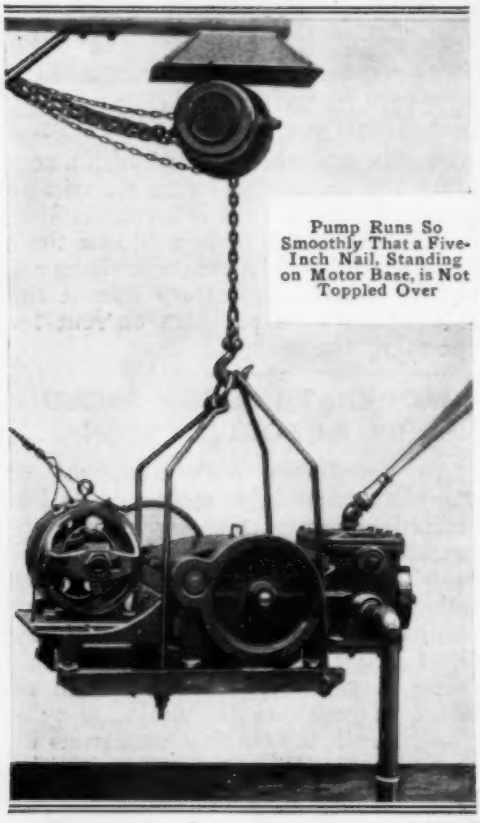
An automobile club composed of many motorists in an eastern state has erected conspicuous signs at approaches to various villages and towns in which the local police are, in the judgment of the club, endeavoring to administer speed laws fairly. These signs notify motor-car drivers of this fact and ask their coöperation in an effort to continue the amicable relationship. It is said that numerous instances of unjust arrest by authorities

An Automobile Club has Erected Many Signs Like This to Enlist the Coöperation of All Motor-Car Drivers in Observing Speed Regulations That Are Reasonable

of small communities caused the club's representatives to make a state-wide investigation, after which these signs were erected to mark the villages with fair police officials.

PLUNGER PUMP WORKS WITH LITTLE VIBRATION

With the ordinary plunger pump vibration is characteristic. The reciprocating pistons propel the water with



Pump Runs So Smoothly That a Five-Inch Nail, Standing on Motor Base, is Not Toppled Over

such energy that their jerky motion is communicated to the whole machine. A pump of new design has been brought out, however, which overcomes the vibration by using cams instead of cranks to drive the pistons. The cams are so shaped that the water moves at the same velocity in all parts of a cycle. Thus convulsive motions are avoided, and since the cylinders are double-acting, the cam shaft is floating, a feature which makes for long life and smooth working. The new pump is especially designed for use in inaccessible places and on temporary work. It may be suspended from a cable where desired. Even in such positions its action is said to be so smooth that a nail may be stood upright on the main frame without toppling over from the jar. An electric motor geared directly to the cam shaft supplies the power.

DENTAL REPAIR WORK AFFECTED BY WAR

Some years ago gold was considered the material par excellence for filling teeth. Recently, however, it has been more or less superseded by a porcelain preparation manufactured in Germany, the latter material closely resembling natural ivory and dentine. Owing to the war the German supply of porcelain is now cut off, and the possibility that the precious yellow metal will resume its place in the field is said to assume considerable proportions. Thus the aversion some people have to displaying a mouthful of gold fillings will have to be conquered unless an American experimenter shortly discovers a process for making the porcelain preparation in this country.

WESTERN HIGHWAY LIGHTED BY LUMINOUS ARCS

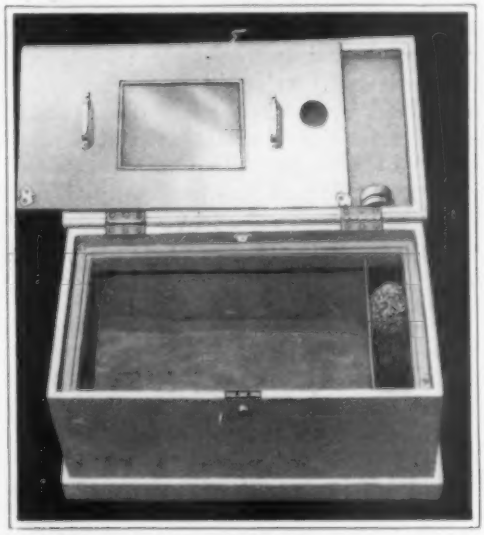
By employing luminous arcs fitted with prismatic refractors and high-efficiency electrodes, very favorable results have apparently been accomplished in lighting the state highway between Chico and Red Bluff, Cal. The lamps are 650 ft. apart and 25 ft. above the roadway. Their rays are thrown upon the turnpike in such a manner that its full surface is illuminated and vehicles clearly silhouetted, permitting them to be seen distinctly at a considerable distance. The refractors used with the lighting units replace the customary reflectors. One of these consists of two layers of prisms, the inner horizontal and the outer vertical, set

Section of California State Highway between Chico and Red Bluff Which is Well Lighted by Luminous Arcs

together with the grooves inside. The rays of light striking the first prisms are redirected and emerge at a 10° angle below horizontal, and are then diffused at a wide angle by the outer prisms. The spaces intervening between the arcs along the road are thus adequately illuminated and the glare of the units lessened to the extent that a driver is not blinded by their intensity.

SIMPLE EXECUTION CHEST FOR ANIMALS

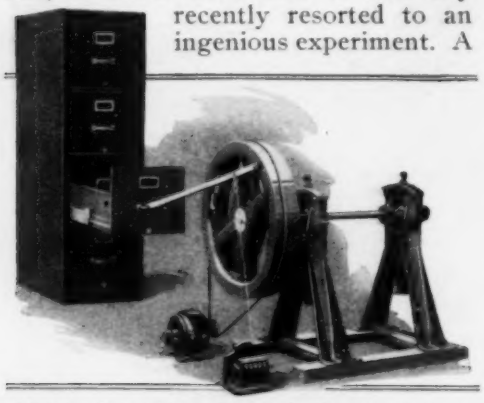
A zinc-lined chest, one end of which is partitioned off with heavy wire netting, is the device constructed by a humane Massachusetts veterinarian in which he chloroforms kittens, puppies, and other animals brought to him to be put to death. In the small compartment is placed a sponge saturated with chloroform; the animal is then placed in the larger compartment, and the cover, which is practically air-tight, is closed. A glass panel in the top enables one to watch the animal within. A small circular hole to which a cork is fitted provides a means for pouring additional anesthetic on the sponge without disturbing the animal. The box is 2 ft. by 18 in., by 20 in. deep.



Cats, Dogs, or Other Small Animals can be Killed Humanely in This Chest, Which Has Separate Compartment for the Anesthetic

STEEL FILING CABINET IS GIVEN SEVERE TEST

To demonstrate the wearing qualities of steel filing cabinets offered for sale, a dealer in a mid-western city recently resorted to an ingenious experiment. A



Machine Tests Filing Cabinet by Running Drawer In and Out 361,321 Times

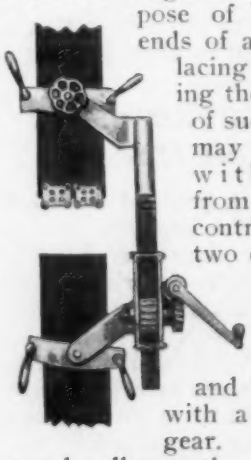
cabinet was set up in the show window, and to the handle on one of its lower drawers an arm was attached. This connected with a crank pin projecting from the side of a large wooden pulley, a small electric motor driving the pulley. When the current was turned on, the pulley revolved at a brisk rate, moving the drawer in and out through the aid of the connecting arm. This operation was kept up continuously for a period of nearly three weeks. During this time the drawer made 361,321 trips in and out, a fact recorded by a mechanical counter attached to the connecting rod with a piece of string. The exhibition drew a large crowd of passers-by.

COLOR PRINTING SIMPLIFIED BY NEW APPARATUS

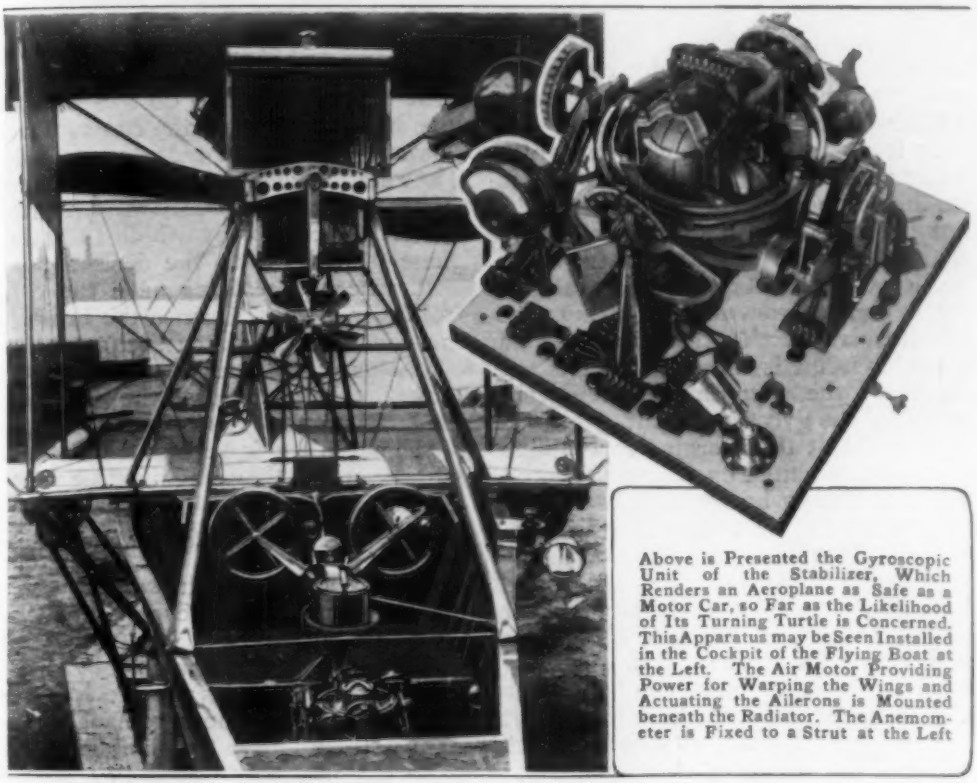
The three primary colors can be printed at the same time by a machine lately developed in Japan which is claimed to be able to complete its operation on small sheets in less time than is ordinarily consumed in printing a single color on large sheets. The blocks for the three colors are placed side by side on the form bed, and the ink ducts are arranged to distribute the colors to those portions of the rollers which cover the respective plates. Three sheets of paper are used on the cylinder simultaneously, one receiving its first color, while another gets its second impression, and the third the last. Either a two-revolution or stop-cylinder type of press may be employed, and at each revolution a tri-colored sheet is produced. The proper register is enabled by the cylinder grippers retaining their hold upon a sheet of paper from the time it is fed to them until it is delivered from the press. After the first impression is made the paper is moved along the cylinder to the proper position to get its second color on the next revolution. Following this it is again moved into place for the third plate and is subsequently discharged from the machine. One of the advantages claimed for the process is that the paper, by receiving its three colors one after the other without delay, is not subjected to the action of the atmosphere, and its size therefore remains the same, eliminating a difficulty frequently encountered in securing the proper register.

MACHINE ASSISTS QUICK LACING OF BELTS

A belt tightener has lately appeared which is designed for the express purpose of holding the two ends of a belt together for lacing or otherwise joining them. With the aid of such a device repairs may be made to a belt without removing it from the pulleys. The contrivance consists of two clamps which grip the belt ends, and draw them together by means of a rack and pinion operated with a crank and worm gear. Considerable and equal pull may thus be exerted on the two ends of the belt and it may be brought to any desired tension.



AEROPLANE STABILIZER THAT TOOK FRENCH PRIZE



Above is Presented the Gyroscopic Unit of the Stabilizer, Which Renders an Aeroplane as Safe as a Motor Car, so Far as the Likelihood of Its Turning Turtle is Concerned. This Apparatus may be Seen Installed in the Cockpit of the Flying Boat at the Left. The Air Motor Providing Power for Warping the Wings and Actuating the Ailerons is Mounted beneath the Radiator. The Anemometer is Fixed to a Strut at the Left

When it is remembered that the Sperry gyroscopic stabilizer makes an aeroplane as safe, so far as upset is concerned, as an automobile, and safer than a small water craft, it is surprising to learn how comparatively simple this apparatus is. The stabilizer was awarded a prize of 50,000 francs by the French government after a series of remarkable tests in 1914, but the full details have only recently been given out. With this apparatus the question of balance, or stability, takes care of itself, and the airman is free to devote all his attention to navigating his machine. The stabilizer is made up of several distinct machines, among them being the gyroscopic unit, which might be called the "brains" of the apparatus; an electric generator that is driven by the engine and drives the gyroscopes; a wind motor that supplies the power for warping the wings or changing the position of the ailerons under the "direction" of the gyroscopic unit, and an anemometer that sets the apparatus in action to volplane the machine when the speed drops to a dangerously low point. Added to these is a control lever that enables the airman to navigate the machine without interference, within safe limits, but prevents him from doing dangerous things, such as making a climb at too steep an angle.

The gyroscopic unit, which instantly detects the slightest deviation from a normal position of flight and acts promptly to have the deviation corrected, consists of a cardan ring in which are nested four gyroscopes. The cardan ring is a device made up of two horizontal rings, one mounted within the other, the inner ring being pivoted to the outer and the outer ring to standards that are supported on the aeroplane frame. Two gyroscopes, re-

volving in opposite directions, serve to keep each ring horizontal regardless of the position of the aeroplane. One line of pivots is at right angle to the other, so that one ring detects lateral and the other longitudinal deviations. Fixed to the end of the axle of each ring is a contactor segment on which bears an electric brush that is mounted on the aeroplane frame. So long as the aeroplane is in a normal position of flight the brush bears on an insulated section of the contactor, but the slightest deviation from normal swings the brush over a section through which an electric circuit is formed. This is the secret of the apparently "intelligent" action of the gyroscopic unit.

The circuit thus formed serves simply to set a clutch on the wind motor, which is driven by the pressure of the air caused by the motion of the aeroplane. Forming part of the wind motor are drums over which are wound lines that control the elevator rudder and the wings, or ailerons, these lines performing the same functions as those used with a manual control. The clutch operated by the gyroscopic unit in any particular case causes the drum required for righting the machine to revolve, and to revolve in the required direction. The instant the machine is brought back to normal position the brush is again over the insulated section of the contactor, the circuit is broken, and the clutch is released. In this way there is a constant setting and releasing of the clutches as required by the changing position of the aeroplane.

Climbing and volplaning, as well as banking on a turn, are accomplished by rotating the contactor segments on their bearings, and to do this the airman has only to push the control lever forward or backward or to one side. The rotation of the contactor causes a current to pass through the brush to the proper clutch, by which the aeroplane is brought to the desired position, where it remains until the control lever is shifted, since the brush is then over the insulated section of the contactor. Automatic volplaning is brought about through the action of the anemometer. So long as the speed of the aeroplane is kept at a safe point the pressure of the air against the vanes of the anemometer overcomes the force of a spring that tends to turn it, but the moment the pressure drops below a certain point the spring causes the anemometer to revolve slightly, throwing an electric switch. The switch closes a circuit that rotates the contactor connected with the longitudinal control and the aeroplane is instantly turned to a volplaning angle. With the increased speed that comes from volplaning, the pressure of the air eventually throws the anemometer back to its original position, whereby the electric circuit is broken, and the apparatus automatically acts to bring the aeroplane back to a level position of flight.

DISAPPEARING BEDS HIDDEN BY BUILT-IN FURNITURE

Some of the late schemes devised for closeting disappearing beds in small houses and cramped city flats seem almost as convenient as they are ingenious. In one instance the lower part of a built-in writing desk is used to conceal a full-sized iron bed. When the latter is not in use the desk appears to have a series of three compartments at the bottom, each provided with a separate door. The floor of the room on the opposite side of the wall, in this case a dressing room and closet, is elevated sufficiently to provide a space for the bed. Quite similar to this is a plan which utilizes the lower portion of a dining-room buffet. The deception here is made even more complete by two drawers built immediately above the space into which the bed is pushed. That part of the buffet which covers the opening is permanently fixed to one end of the bed, so that the latter is drawn out and pushed in precisely the same as if it were a great drawer. For a living room a practical

A Seat Like This One Is Attractive in Any Living Room and Gives No Hint That It Conceals a Bed. If a Porch Is on the Opposite Side of the Wall the Bed can be Used There Also
This Shows a Full-Sized Bed Drawn from the Innocent-Looking Seat, Which Is the Same as That Illustrated in the Opposite Corner of the Page
Although Not so Desirable a Place as Might be Provided, a Built-In Buffet Offers a Hiding Place for an Extra Bed
Here a Writing Desk Is in Reality a Bed. It Takes But a Moment to Withdraw the Latter and Convert a Room into a Sleeping Chamber. When Pushed Back into Its Berth the Bed Slides beneath the Elevated Floor of the Adjoining Closet
When the Bed is Put Away for the Day, the Big, Roomy Writing Desk Conceals It Completely and Forms a Very Useful Article of Furniture in a Small Apartment

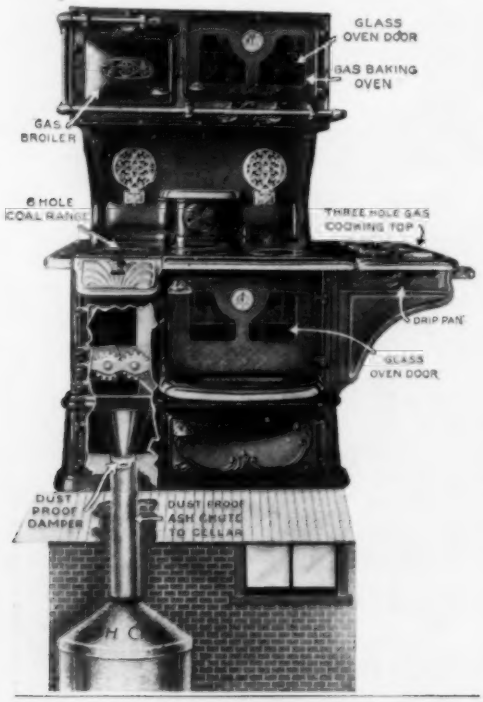
recess is provided by building a large, roomy seat and utilizing the space beneath it. To completely conceal the bed, in case this plan is followed, a similar seat may be constructed on the opposite side of the wall. Should a sleeping porch be opposite, the same plan may be adopted. In either of these instances the bed could be drawn from both sides, and in the latter case used in a room or on a porch.

¶Silk treated with oil varnish and tinted the color of meat constitutes a new sausage skin invented in England.

TWO-FUEL RANGE EQUIPPED WITH ASH CHUTE

Features which are very convenient for a housewife are to be found in a combination gas and coal range which has lately been developed for domestic use. It is provided with an ash chute which is permanently installed beneath the grate and discharges into a medium-sized sheet-metal receptacle in the basement of a building. All the dust and trouble which usually attends the removal of ashes from a range is in this way completely eliminated. At

the right side of the stove is a three-hole gas cooking top which is supplied with a drip pan. Elevated above the



When the Grate is Shaken the Ashes are Discharged into the Chute and Deposited in a Can Provided in the Cellar

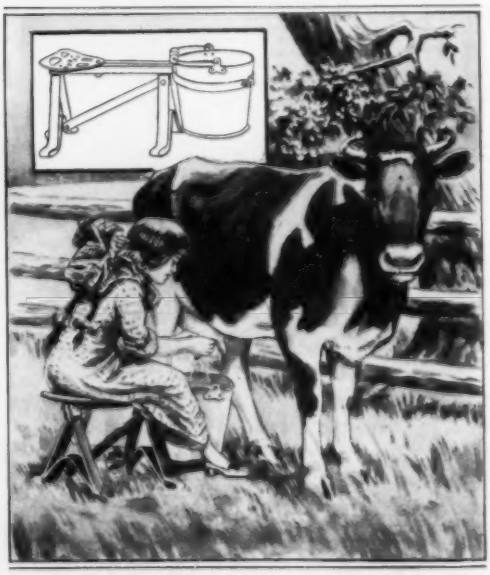
top of the range proper are a large gas oven and broiler, the former fitted with a glass door and a dial thermometer. The coal-heated oven, which is similarly equipped, is below in the customary position.

WOODEN SHINGLES RENDERED FIRE-RETARDING

Successful experiments in making wooden shingles fire-retardant have been conducted in a state laboratory recently. Air-dried shingles are treated with a solution of borax in water. The shingles are then kiln-dried to about 10-per-cent moisture, and a second treatment of zinc-chloride solution applied. After being again dried the shingles are ready for use. The solutions must be applied under heavy pressure, and since that process involves strong retorts, measuring tanks, etc., it will be profitable to treat shingles in this way only in large quantities. The fire-retardant qualities are secured by the formation of an insoluble salt, sodium borate. While shingles treated in this manner will burn when subjected to very strong heat, they will not burn with a flame, the salt having fused and coated the cell walls of the wood fiber.

MILKING STOOL PREVENTS SPILLING OF MILK

A combination milking stool and pail holder which by preventing the spilling of milk makes possible a considerable saving, has been patented. It consists of a metal frame, aluminum painted, with four spreading legs which can be folded under the frame when not in use. On the frame is a seat resting on ball bearings which permit it to be moved forward or backward a distance of 4 in. At the opposite end of the stool from the seat is a circular holder that can be adjusted to hold a pail of



The Seat of This Milking Stool can be Moved Forward or Backward Easily, and the Pail can be Swung to One Side Out of the Way of the Cow

any size. It is so hinged that the pail can be quickly swung to one side in case the cow begins to move about.

USE MOTION PICTURES TO IDENTIFY CRIMINALS

The use of motion pictures as a means of identifying criminals to supplement ordinary photographs, finger prints, and other methods now employed, has been tried experimentally by the police force of Chicago. Heretofore only a limited number of police officers could personally familiarize themselves with the general appearance of criminals and suspects under arrest. But by taking motion pictures of these men their whole figures and their manner of movement can be made familiar to an entire force. The method has this special advantage of making identification dependent not alone on facial likeness, etc., but portrays numerous other identifying characteristics such as step and posture.

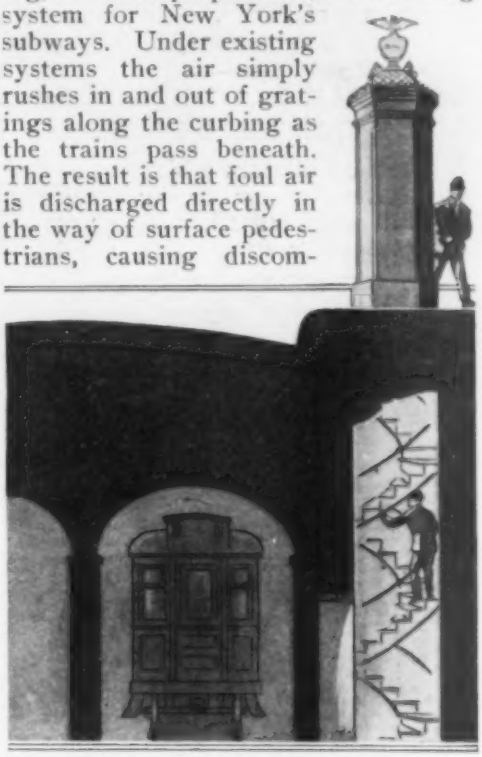
PHILADELPHIA MINT COINS SOUTH AMERICAN MONEY

Pleasing evidence of the increasingly friendly feeling between the United States and South American republics is found in the fact that the Philadelphia mint made coins for more foreign countries in 1914 than in any previous year, and that this foreign trade came from Cuba, Costa Rica, Salvador, and Ecuador. Before the war several of the South American governments patronized European mints, but it is believed that the coining business secured by the United States mints will continue after the war. Every effort has been made to furnish the new patrons with satisfactory shipping facilities and simplified methods of payment.

¶During a five-week period last fall the Russian fortress at Dvinsk was captured 15 times. The stronghold is constructed of sand, and near the close of the year still existed. Incessant bombarding which would have demolished any ordinary position reduced the size of this one by half without weakening the remaining portion.

WOULD USE KIOSKS FOR VENTILATING SUBWAYS

The use of kiosks, or small round towers perched on sidewalk or curbing, has been proposed as a ventilating system for New York's subways. Under existing systems the air simply rushes in and out of gratings along the curbing as the trains pass beneath. The result is that foul air is discharged directly in the way of surface pedestrians, causing discomfort. Also the gratings have proved insufficient to keep air within the tunnel properly cooled and purified. Kiosks, it is claimed, will overcome these difficulties. Being 12 ft. high, and equipped with electric fans, they may discharge accumulated dust and moisture high over the heads of street crowds, as well as take in purer air from those regions on demand. As at present designed, they will be 5 ft. in diameter and placed one in every block. Their large size will permit of installing winding stairways for use as emergency exits in case of subway accidents. To defray in part the large expense of installing the kiosks, it is proposed to lease their exterior panels



By Constructing Kiosks as Shown Here, It Is Proposed to Furnish Ventilators for New York's Subways That may Also be Used as Exits

to advertising concerns, possibly retaining one surface on each structure to serve as neighborhood directories. When neatly made, advertisements do not detract from the artistic appearance of the kiosks, as has been demonstrated in the case of Berlin, where many such structures have already been erected.

PORTABLE ELECTRIC HEATER FOR DOMESTIC PURPOSES

Electric radiators which are especially suited for use during the spring and fall when large heating plants are not altogether dependable, are being

The Electric Heater may be Used on a Table or Floor in Any Room Desired

developed in many sizes and styles. One of these, which is of convenient proportion, is supplied with two resistance coils in a bowl-shaped reflector supported about a foot and a half high on a standard. The heating elements are protected by a substantial wire guard to prevent accidents. It weighs only a few pounds, so it may be conveniently employed wherever it is needed in a home by connecting it with a light socket. According to the wishes of the user, it may be set on a table or placed on a floor. The initial cost is about the same as that of a small electric fan, and the operating expense is not excessive.

FIND PINE-OIL DERIVATIVE VALUABLE DISINFECTANT

Announcement has been made of the discovery of a new disinfectant which is derived from pine oil, a by-product obtained in the manufacture of turpentine. Besides costing only 50 cents a gallon to produce, it is nontoxic and possesses four times the disinfecting properties of carbolic acid. It was found during a series of experiments conducted by the United States Public Health Service at the hygienic laboratory and is easily prepared by combining the oil with resin and a solution of sodium hydroxide. The product is a reddish-brown liquid which has an oily appearance and is somewhat thick. When diluted with water it makes a milk-white emulsion which is not objectionable to taste and gives off a pleasing odor. The liquid will not attack fabrics nor metal, and may be safely used as a mouth wash or spray.

MAIL BOX AND MILK-BOTTLE HOLDER COMBINED

Many housewives have been annoyed by cats and dogs which have overturned or otherwise disturbed the milk which has been left at the door in the early morning. Doorstep thieves frequently cause more serious inconvenience. To overcome these difficulties there has been invented a combined mail box and milk-bottle holder. This permits one or two bottles to be hung immediately beneath the box on a rack which locks as soon as the bottle is slipped into place. The flange running around the top of the bottle prevents it from dropping from its place. Only a person with a proper key can take away the bottle.

Above, and in the Insert, the Brush Cutter is Shown in a Dense Thicket Leveling the Undergrowth and Piling It on One Side of the 16-Foot Path It Cuts

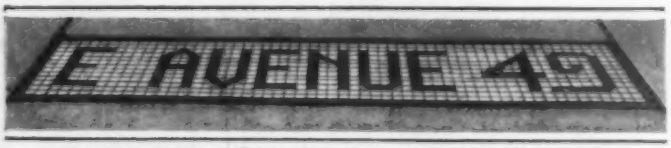
Here is a Strip of Land over Which the Machine has Passed. Formerly It was Covered by a Thicket as Heavy as That to be Seen at Some Distance in the Background

POWER CUTTER RAZES CANADIAN BRUSH

In certain sections of western Canada brushwood and young timber cover whole areas in thick mats, making the district of little value for agriculture, even though possessing a rich soil. To rid these regions of the incumbrance in a practical manner, a power cutter has been invented, intended to displace the older hand ax and kindred slow tools. A gasoline tractor furnishes the motive power, and to its front end a sort of "cow-catcher" arrangement is fastened. On the front edges of this triangle-shaped framework, long, sharp knives present razor edges. In going through brush the long caterpillar wheels on the tractor catch a firm grip in the soil and force the knife-edged prow in among the saplings. The result is that they are sliced off neatly and smoothly close to the ground, leaving the soil in satisfactory condition for plowing. The machine also automatically piles the trees in neat windrows.

LARGE TILE STREET SIGNS LAID IN SIDEWALKS

Street signs of the ordinary type, which necessitate the erection of posts at intersections, are usually unsightly and rarely remain intact more than a few years. For a long time different cities in climates untroubled by snow have attempted to overcome the latter difficulty by inlaying street names in cement sidewalks. Most often this plan has been unsatisfactory, because, for the sake of appearance, the signs have been made too small. A Pacific coast city is now trying out a tile sidewalk sign, 4 ft. long and 1 ft. wide, which may be easily read at night on well-lighted streets. So far as is apparent, it serves its purpose satisfactorily.



The Sign, Made of Tile and Sunk into the Sidewalk, Is Large Enough to be Easily Read

LEASE WON BY AEROPLANE RACING AGAINST MOTOR

An oil lease, said to be very valuable, was the prize in a race between a motor car and an aeroplane in Oklahoma recently, and the aeroplane won in spite of the fact that the car had a handicap of four miles. The driver of the automobile learned that an Indian's oil lease was about to be renewed and started posthaste to secure the rights for himself, when a representative of an oil company, also desirous of obtaining the lease, procured an aeroplane from a near-by aviation school and reached the owner of the oil fields first, with the result that he secured the lease.

CHANGE GRADE OF TUNNEL IN LOS ANGELES STREET

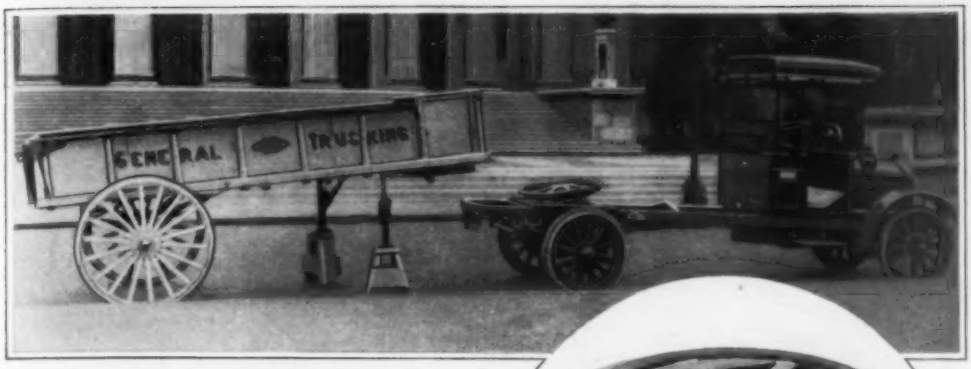
Quite an interesting piece of engineering work was recently undertaken at Los Angeles when the task of changing the level of an old tunnel was commenced. The bore accommodates vehicle traffic on one of the city's thoroughfares and was originally about 25 feet higher at the south end than at its opposite portal. A cut of some 15 feet was made in the street at this entrance, making it necessary to correct the level of the tube correspondingly. This was done by constructing virtually a new tunnel beneath a part of the old one and carrying its arched walls along to the point of their union with the original structure. The plan included the sealing of the upper archway.

FIFTH WHEEL INCREASES AUTO'S CAPABILITIES

An old-fashioned part of the ordinary horse-drawn wagon has recently been adapted for use on a motor truck for the purpose of attaching a trailer in a manner that seems to be an improvement upon other means to the same end. The new device is simply a "fifth wheel," and is intended to be mounted on the chassis of an automobile just above the rear axle. With its aid a two-wheel trailer may be attached to the machine, and a load several times the ordinary size carried safely.

The attachment consists principally of two flat steel rings, two to three feet in diameter, one of which rotates upon the other, and both being connected by a kingbolt at the center, as in the ordinary fifth wheel. The under ring is supported by an axle and bearings attached to the motor truck. The

This Photograph Gives a Clear Idea of the Method of Construction Followed in Correcting the Grade of the Tunnel to Correspond with the New Street Level



By Means of This "Fifth Wheel," Which Has Several Distinctive Features, a Two-Wheel Trailer can be Easily Attached to or Detached from a Motor Truck

front end of the trailer is attached to the upper ring. The flexibility provided by the cross axle allows free movement of the trailer in going over uneven roads, the cross axle serving this purpose better, in the opinion of the inventor, than would the universal joint sometimes advocated for the purpose. Aside from increased carrying capacity, several other advantages are claimed for the arrangement. One trailer may be loaded while another is being hauled to destination; half, or more, of a truck load is carried on the steel-tired wheels of the trailer, correspondingly reducing bills for rubber tires on the truck itself; and, since part of the load is bearing on the driving wheels, tractive effort and load-pulling powers are increased, instead of possibly lessened, as when a four-wheeled trailer is used. The increased usefulness of a farmer's light automobile with a two-wheel trailer has caused considerable interest in attachments of fifth-wheel nature.

WRIST WATCH DESIGNED ESPECIALLY FOR MEN

A new type of wrist watch, designed especially for men, has been placed on the market by a large watch manufacturer. It is strongly made, almost severe in design, with plain Roman numerals, and without the leather case that has been in common use. The straps are attached to projecting loops which are an integral part of the case, which is of 14-carat gold and hence will not corrode or discolor. A heavy engine turning on the back of the case allows an air space between the wrist and the watch. The men of the United States have been less ready to adopt wrist watches than those of European countries, but it is believed that the great convenience of the wrist time-

This Wrist Watch Is Heavier and More Plain than Those Designed for Women

pieces, which have already gained some favor with police and army officers and sportsmen, will make their use common among the men of this country.

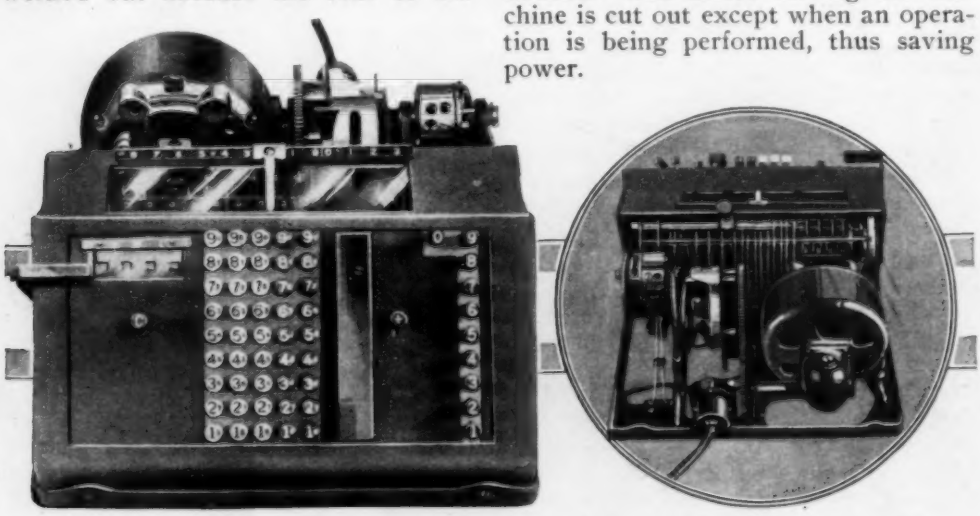
ELECTRIC DOORBELL MADE FOR HOUSE CAT

When a cat, owned by the keeper of the Platte Fougère lighthouse on the Island of Guernsey, wishes to enter its master's dwelling it rings an electric bell to summon a member of the household to the door. This has been made possible by the construction, near the bottom of a door, of a shelf which actuates a switch when a slight weight is placed upon it. Thus, when the cat jumps onto this small ledge, which is supported by a bracket, the circuit is closed.

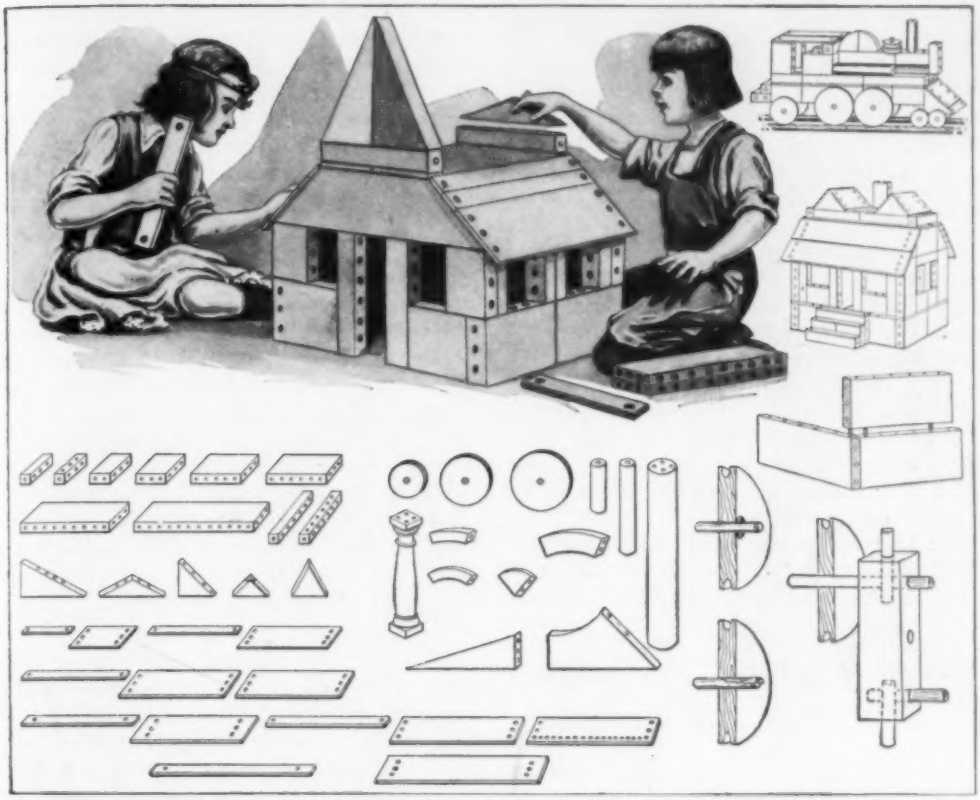
After the installation had been made it took but a short time to train the pet to make use of its rather modern convenience. The scheme was worked out because the roar of the wind and sea drowned the cat's cries and made it impossible for those within the house to hear it when it wished admittance.

DESK CALCULATOR DOES VARIED WORK

A contrivance that will add, subtract, multiply, and divide, all within a desk space a little over a foot square, is a convenience lately devised for business use. The new machine is driven by a $\frac{1}{12}$-hp. motor. Five rows of nine keys each supply the adding and subtracting element, this part operating much as in the ordinary adding machine. In multiplying, a number is first set up among the keys of the adding section. Afterward the multiplier, digit by digit, is registered on a single row of keys at the right. The product of the two numbers is at once given by indicators at the top of the machine. Through the fact that operations may be reversed, proof of a given multiplication may readily be obtained by division, as in ordinary arithmetic. When it is desired to keep a given number set up continuously throughout a series of computing operations, a key marked "C" may be depressed. This holds the number "constant" until a change is desired. The motor driving the machine is cut out except when an operation is being performed, thus saving power.



Addition, Subtraction, Multiplication, and Division are All Performed on This Small, Electrically Driven Desk Machine



Model Amusement Parks, Pavilions, and the Like, may be Built with This New Form of Architectural Toy

PEGS HOLD TOY BUILDING BLOCKS TOGETHER

Most construction toys on the market are patterned after structural-steel shapes, or else the simpler kinds of machinery, thus being particularly concerned with the engineering field. A form of toy lately brought out caters more especially to architectural interests. The various pieces forming a set are made of wood and when fitted together are held by especially designed pegs, or dowel pins. All sorts of elaborate buildings may be erected by the small builder at will, and at the same time a number of interesting effects secured. The blocks in one type of set are especially designed for making a model amusement park, the several pavilions, shoot-the-chutes, Ferris wheels, etc., being realistically produced.

OIL TRANSMISSION DOES AWAY WITH SHIFT GEARS

Remarkable things are claimed for an oil-transmission device recently invented. Going down a 23-per-cent grade at the rate of 25 miles per hour, an automobile equipped with the device was able to stop almost instantly, reverse, and back up the hill with scarcely any of the jar or grinding of brakes usually associated with such an operation. The contrivance permits of any range in transmission ratio from absolute disconnection to a stage where engine and

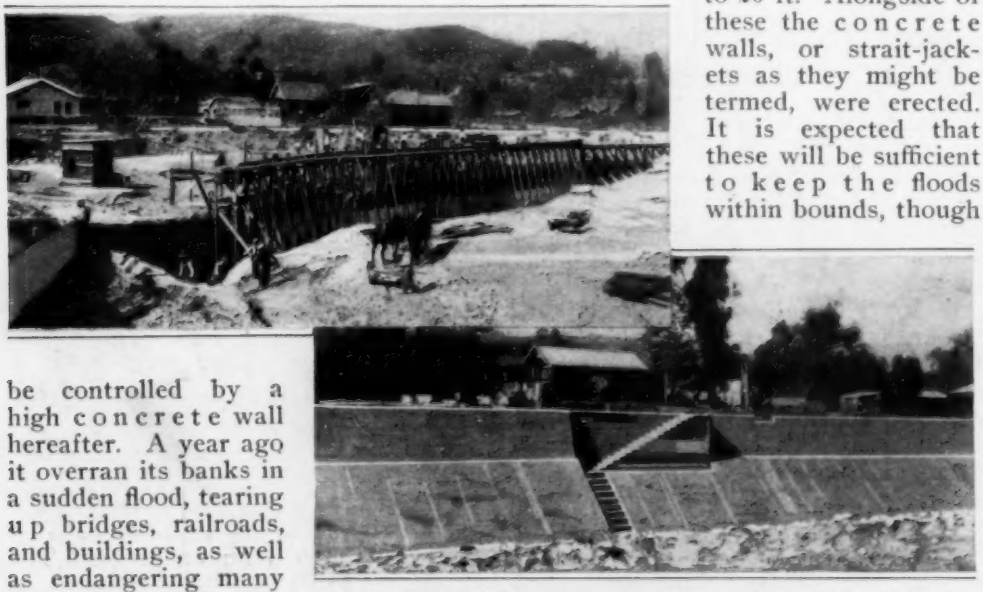
driving shaft are directly coupled together. There are no set speeds forward and reverse. These may have any value, dependent upon the position of a certain lever, convenient to the hand of the driver, which controls the position of an oil valve on the interior of the machine.

The contrivance accomplishes its purpose on a principle somewhat similar to an idler pulley operating on a loose belt, as, for instance, in the common example afforded by a belt-driven motorcycle. Here the tighter the idler pulley is pressed against the belt, the more in unison do hind wheel and engine rotate. Loosening the idler permits a certain slippage between engine and belt, and the motorcycle travels slower as a result.

In the same way this oil transmission provides a "slip medium" between engine and rear wheels of an automobile. One half is coupled to the engine, and the other half to the driving shaft. A hollow cam within one part, rotated at slow speed by a set of gears, causes certain pistons to go in and out of cylinders connected to the other part. Oil is accordingly driven in and out of the cylinders, and the ease with which it makes entrance and exit determines how directly coupled the two halves of the transmission are. An oil valve controlling the exit and entrance ports governs the whole contrivance, and it is only necessary partly to open or close this with the lever at the chauffeur's seat in order to secure any desired speed ratio between engine and driven shaft. Reversals are accomplished by the simple expedient of clamping a brake strap to the outside shell of the mechanism, holding it stationary, and causing the interior to rotate in a backward direction.

CONCRETE STRAIT-JACKET SUBDUES RIVER FLOODS

Caprices of the Arroyo Seco, a tributary of the Los Angeles River, are to be controlled by a high concrete wall hereafter. A year ago it overran its banks in a sudden flood, tearing up bridges, railroads, and buildings, as well as endangering many human lives. During the summer of 1915 large crews of men were at work with dredges at the point of overflow, digging a new and deeper channel. Over a mile's length of such excavations had to be made, the depth varying from 10 to 20 ft. Alongside of these the concrete walls, or strait-jackets as they might be termed, were erected. It is expected that these will be sufficient to keep the floods within bounds, though



Showing a Section of the Completed Concrete Wall Which will Confine the Arroyo Seco River to Its Channel; Also the Method of Erecting Forms for the Work

the mountain snows melt so fast that the waters are hard to control. Material removed in making the channel was put to interesting use. Most of it was gravel and rock. The latter was run through crushers and later assorted to size with the aid of a tower 100 or more feet high which contained sizing screens. A continual stream of auto trucks carried the material, as fast as obtained, to various parts of adjacent cities, where it found ready use in the construction of roads and pavements.

HOW ANIMALS ARE AFFECTED BY GUNFIRE

Persons who have seen considerable service in the present war have observed that gunfire has various and interesting effects on different animals. Dogs as a rule show great distress when shells burst near them and howl piteously, but during rifle fire have been known to dash along in front of a trench barking vigorously, apparently enjoying the noise. Cats seem to be indifferent to the character of the conflict about them so long as they have a corner in which to sleep and eat. Lost dogs and cats have actually ventured into the trenches during engagements. Some of these pets once lived in cottages destroyed by earlier fighting. The marks on the collars of others showed that they had traveled long distances. A yeomanry regiment from the west of England possesses a black cat which came to it in the midst of a bombardment that killed many men. It lives sumptuously.

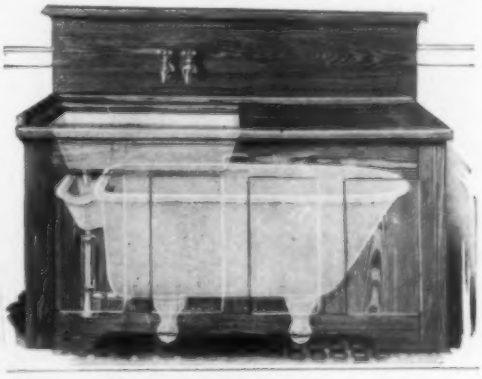
MOTORCYCLE WITH SIDECAR FOR MAIL CARRIERS

A motorcycle with an especially designed sidecar is now in use on certain rural free-delivery routes. The sidecar is of steel, completely inclosed. Near the top are drawers opening toward the driver, in which mail can be packed in the order in which it will be needed on the route. Below the drawers is a more spacious compartment. By using one of these motorcycles a carrier saves much time and inconvenience.

The Sidecar of This Motorcycle Has Several Compartments and is Designed Especially for Rural-Mail Carriers

CONCEALED BATHTUB MADE FOR SMALL DWELLING

By utilizing the space ordinarily wasted beneath a kitchen sink as a place of concealment for a bathtub, a curious plan has been evolved for providing bathing facilities in cramped houses which are without toilet rooms. The sink and its accompanying drain board occupy the top of a movable cabinet of neat appearance. The backboard of this is permanently fixed to a wall, and water faucets are attached to

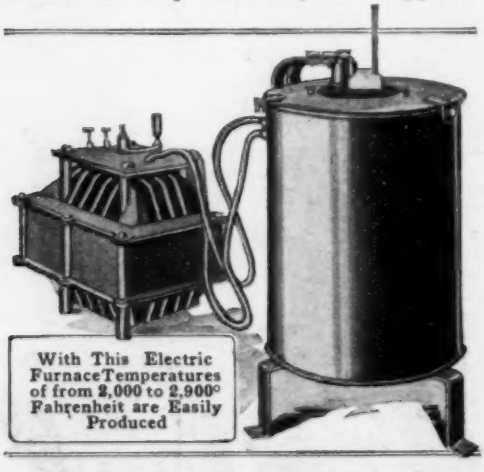


When Not in Use the Sink Cabinet Completely Hides the Bathtub from View

it immediately over the sink. The bathtub is permanently installed beneath the cabinet and at the front end supports a small basin, connected with the waste pipe, into which the water from the sink is drained. Normally the bathtub is entirely out of sight. When it is to be used, however, the cabinet, holding the sink, is moved away from the wall to give free access to it. Water is then supplied through faucets attached to the board above.

NEW ELECTRIC FURNACE FOR LABORATORY USE

With a new electric furnace designed for laboratory work it is easily possible to obtain temperatures ranging from 2,000° F. to 2,900° F. This furnace is of the vertical type, and is 13 in. in diameter and 18½ in. high. It consists of three main parts—a graphite heater unit, an inner compartment of molded refractory material into which the heater unit fits, and an outer compartment filled with powdered refractory material. A feature of the furnace is that it is of the nonvacuum type, the furnace itself automatically developing an atmosphere of carbon monoxide in the heating chamber. The outer jacket is made of polished monel metal. The power may be supplied



With This Electric Furnace Temperatures of from 2,000 to 2,900° Fahrenheit are Easily Produced

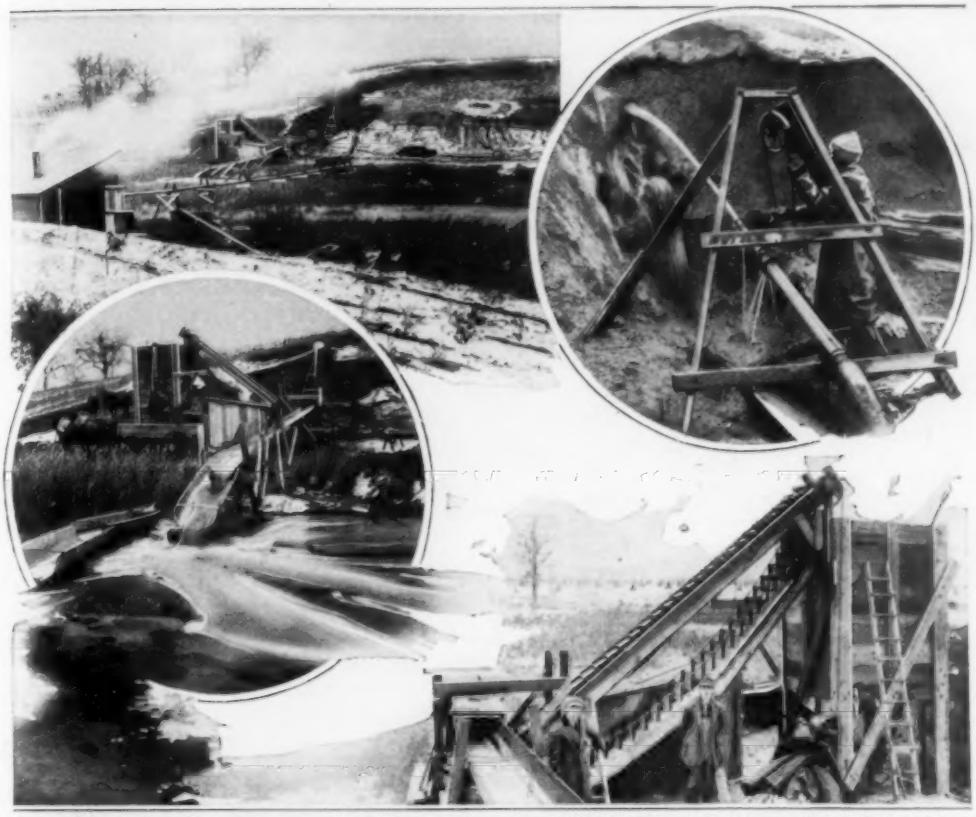
from storage batteries, but an alternating current with a transformer is generally employed. By means of a "cascade" attachment used in connection with the furnace, temperatures higher than 6,500° F. can be obtained.

NEW TOPOGRAPHICAL MAP FOR AIR SCOUTS

A portable topographical map for the use of air scouts, which will enable them to make quick, realistic reports of observations, has been invented by a marine sergeant at Washington. The problem of reproducing on a desired scale the elevations and depressions, the outlines of bodies of water, and the contour of valleys, as an aviator is able to ascertain them, has been solved, it is believed, by this device. An essential feature is a worm gearing operated by telescopic thumbscrews, by means of which the desired variations in the surface of the map are secured. The map is light but strongly built, and military men believe that the effectiveness of the aviation service for scouting purposes will be greatly increased with the aid of this invention.

WASH GRAVEL FROM BANKS FOR ROAD BUILDING

Washed and screened gravel for highway-construction purposes is being obtained by a county-road commission in Michigan by a hydraulic mining process. The plan has been found to be both practical and economical, because the material is collected ready for use and loaded without hand labor. The apparatus used in the work is simple in construction and comparatively inexpensive. At one gravel pit, illustrated herewith, water is carried across a marsh under pressure to a bank on the opposite side. The stream is directed against the wall so that the formation is washed into sluice boxes. A second jet of water at the mouth of the trough forces the material along to a point where it flows into the screened pockets of a conveyor, which is operated by a small gas engine. The gravel, thus separated, is carried by the elevator into a hopper provided with an

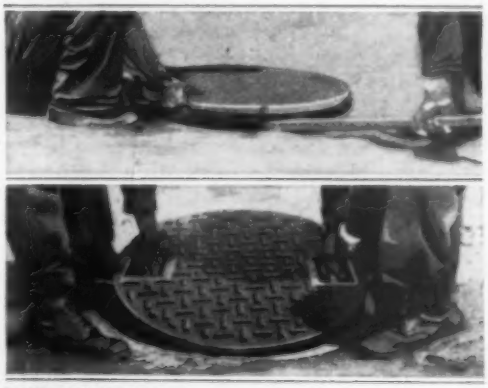


The Photographs Above Illustrate the Hydraulic Process of Mining Gravel for Use in Road Building: At Top, on the Left, Is a View of a Plant Operating near Battle Creek, Michigan. The Insert at the Right of This Shows How the Water Cuts into the Embankment and Carries the Gravel and Sand into Sluice Boxes. The Former is Caught in the Screened Pockets of a Conveyor, Washed, and Elevated into a Hopper, as Indicated Below at the Right. In the Other Insert the Sand and Dirt are being Sluiced into a Hollow

inclined bottom and trapdoor, through which the gravel is chuted into a wagon. The sand and earth are sluiced into the hollow to fill and reclaim the waste land.

DISAPPEARING HANDLES FOR MANHOLE COVERS

There are many objections to the ordinary type of manhole cover which, it is believed, are overcome in the construction of a cover fitted with disappearing handles. To raise a cover of the common type requires the use of a crowbar or other sharp-pointed heavy tool. Frequently such means are not at hand and a rusted or tightly fitting cover will cause annoyance and sometimes accident by injuring the hands of the workman. The handles fitted to the new cover can be easily and firmly grasped and, being countersunk, do not furnish any unevenness on the street surface.

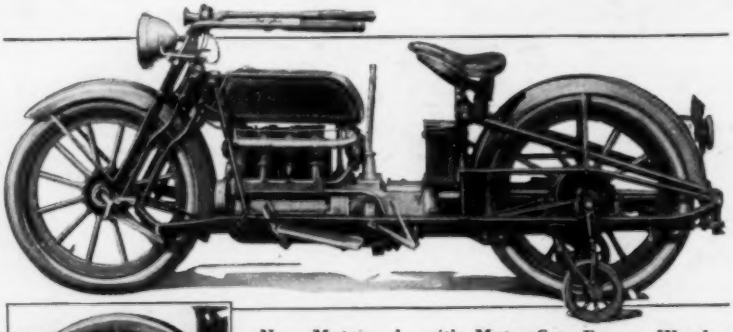


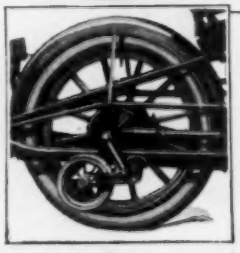
COURTESY OF SAFETY NEWS

A New Type of Manhole Cover is Fitted with Disappearing Handles Which Save Much Inconvenience and Prevent Accidents

FRAME OF NEW MOTORCYCLE LIKE THAT OF MOTOR CAR

Several novel ideas have been applied in designing a new four-cylinder motorcycle, an approved model of which has recently been displayed. In many particulars the machine departs radically from the established form of construction and embodies features characteristic of an auto.





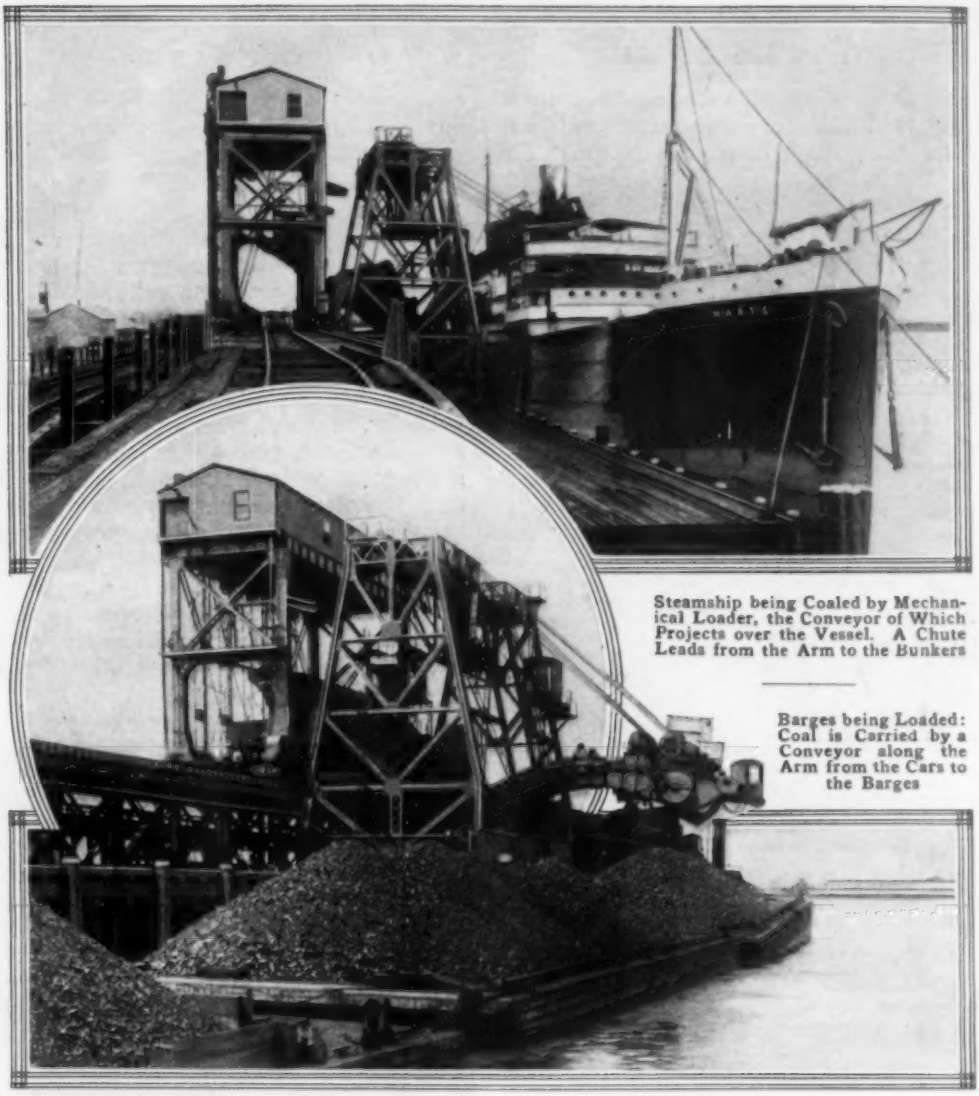
New Motorcycle with Motor-Car Frame, Wooden Wheels, Shaft Propulsion and Selective Transmission

One of its most salient points is its frame, which is entirely different from the diamond, or loop, type, commonly used. It is similar only to that of a car and extends back of the rear wheel, forming a point to which cantilever arms supporting the seat are pivoted. The fore part of the frame is bowed out in a "V" shape from the forward motor supports, to allow the front wheel to swing within it.

An 11.23-hp. motor, with selective sliding-gear transmission, is mounted on the frame immediately back of the front wheel, leaving an open space before the seat. A propulsion shaft replaces the driving chain. The front forks are of peculiar construction, as well as the front axle, which is a large hollow affair. A curved bar attached to the middle fork member passes through this and serves as a brace to prevent the steering fork from being sprung. Idler wheels are provided at the rear, making it possible for a rider to stop or back up without placing his feet on the ground to support the machine. A 3-gal. gas tank is mounted over the motor. A self-starter is contained within the clutch compartment of the transmission case. The machine is a modification and improvement upon one of somewhat similar construction which was promoted several years ago.

NEW COAL-HANDLING PLANT LOADS MECHANICALLY

What is said to be the first coal-handling plant of its size on the eastern seaboard, which is arranged for mechanical handling of coal, instead of for gravity loading, has been erected at Charleston, S. C., by a southern railroad. One important advantage claimed for this plant is that it can be erected at a much lower cost than a high gravity pier plant; also the breakage of the fuel is said to be less. The plant consists of a wooden railroad trestle built out into a bay about half a mile to reach deep water. At the end of the trestle, and standing alongside it, is a pier about the length of a coal freighter. The loading machinery is located on this pier. At its outer end the railroad trestle carries the cars to about 17 ft. above the pier. On the top of the trestle is located a movable car dumper of the standard type. A movable loading tower stands beside the car dumper but rests on a track on the pier. From the railroad trestle the coal cars are dumped into a "V"-shaped hopper of 100-ton capacity, which is part of the loading-tower equipment. A movable false bottom in the hopper prevents excessive coal breakage by



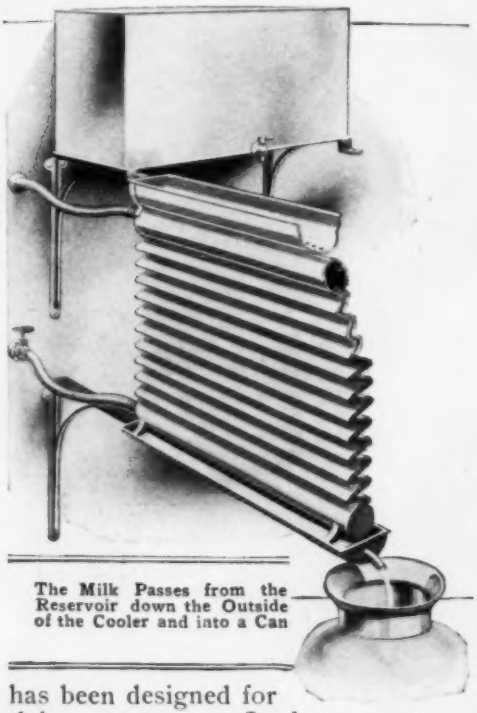
Steamship being Coaled by Mechanical Loader, the Conveyor of Which Projects over the Vessel. A Chute Leads from the Arm to the Bunkers

Barges being Loaded: Coal is Carried by a Conveyor along the Arm from the Cars to the Barges

shortening the fall of the coal. From the hopper the coal is discharged into a conveyor which carries it through a long curved arm that extends out over the barges or ships to be loaded. A long telescopic chute for the coal is let down from the end of the arm into the hold of the vessel to be loaded and is gradually shortened as the bunkers fill. This conveying arm is arranged for hinged vertical motion and also has an 8-ft. horizontal movement so that it can be adapted to ships of various heights and widths. The plant is electrically operated, alternating current being converted by a substation into low-voltage direct current. Three men are required to operate it. One, in the cab at the end of the arm, has control of the hopper motor and other loading motors and loads the boats; a second operates the car dumper, and a third regulates the moving of the car along the track. The entire plant is designed to handle 30 cars an hour in capacities up to 100 tons each.

MILK AERATOR AND COOLER FOR DAIRY USE

For cooling and aerating fresh milk, as well as for removing the animal odor from it, a simple apparatus



The Milk Passes from the Reservoir down the Outside of the Cooler and into a Can

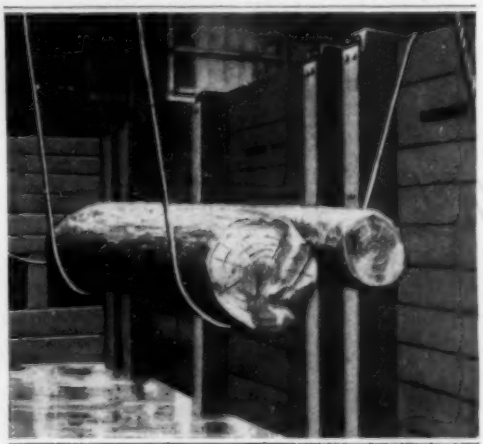
has been designed for dairy purposes. It is made in four sizes, the largest of which has a capacity of 80 gal. an hour. The cooler, which is of the corrugated type, is set on brackets immediately under a reservoir. A faucet in the latter permits the warm milk to flow into a perforated trough which distributes it along the cylindrical top of the cooler. It then passes down the outside in a thin sheet, dripping into a trough at the bottom and draining into a can. Water enters the cooler at the bottom, circulates through it and passes out through a hose at the top. The temperature of the milk is lowered to within approximately two degrees of that of the water used. The device is made of heavily tinned copper and is provided with removable troughs which may be easily sterilized after use.

APPARATUS TESTS STRENGTH OF VARIOUS FABRICS

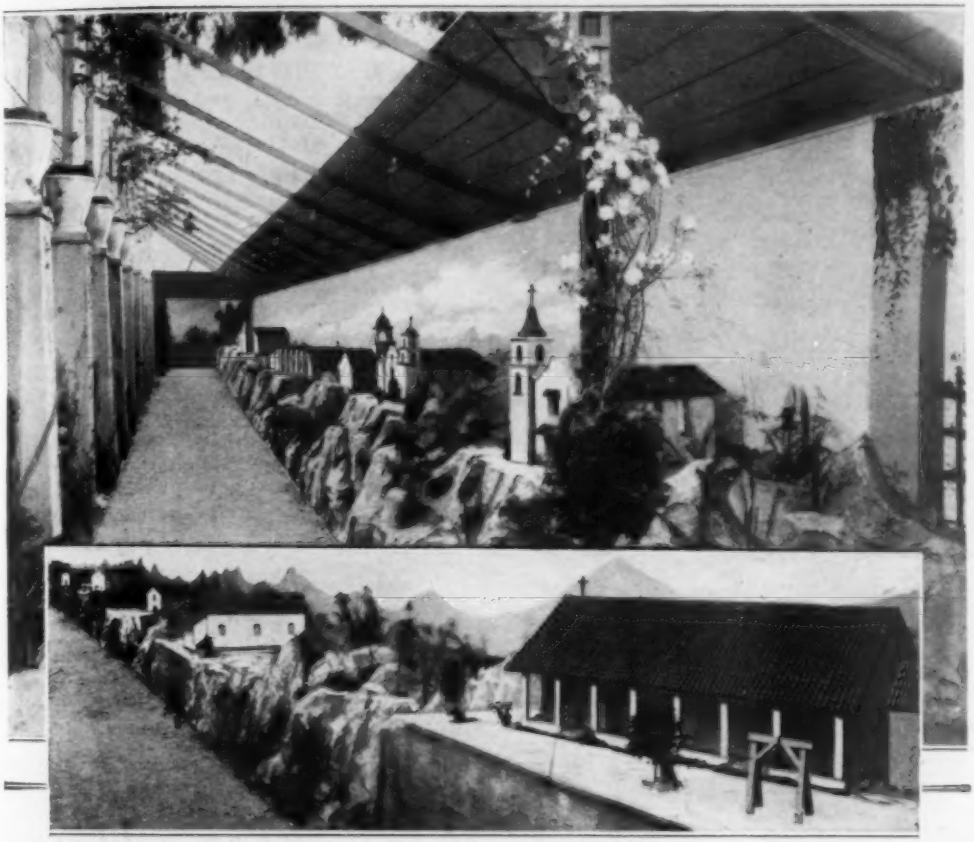
At one of the great worsted centers in England a machine has been developed for determining the wearing qualities of different fabrics. The apparatus is simple in principle and automatic in action. When testing a sample of cloth one end of the piece is fastened in a rigid jaw and the other clamped to a roller. Weights are so suspended from the latter that the goods is drawn taut and brought against a rubbing device. This consists of a motor-driven cylinder, in which a series of dull-edged blades are set, and which makes a single revolution in first one direction and then the other. Each two-way turn of this kind is called a rub and recorded by a mechanical counter. When a fabric is worn through by this process the machine is automatically stopped. The number of so-called rubs it has received indicates its degree of durability.

NEW LOG HOIST SUPPLANTS OLD METHOD IN SAWMILL

A simple log hoist which has been in use in an Oregon lumber mill for more than a year is said to be superior to the common method of carrying logs into a mill by means of an endless chain, with dogs, which engages the



Logs are Easily Raised into a Sawmill by Means of Cables Shown Which are Wound on a Revolving Drum



These Picturesque Models of the Old Spanish Missions of California are Arranged in a Portico about a Theater Erected for the Purpose of Presenting Dramatically the Story of the Missions

logs and draws them up an incline. By the new method the logs are floated into a narrow slip by the action of an artificially created current. Lowered into the slip before the logs enter are wire cables, as shown in the illustration. When the logs are in position above the cables the latter's free ends which are attached to a revolving drum are wound up, thereby raising the logs from the water and finally rolling them onto a dock in front of the main saw.

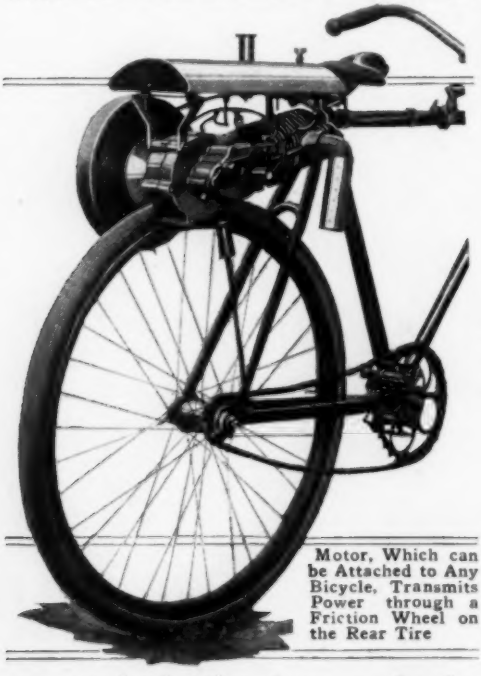
OLD CALIFORNIA MISSIONS SHOWN IN MINIATURE

The famous old Spanish missions of California have been reproduced in miniature which forms a feature of a portico surrounding three sides of an unusual theater built near Los Angeles. This theater was erected for the purpose of presenting a historical play which tells of the varying fortunes of those who built the missions. That the public might more vividly appreciate the setting for the incidents in this pageant play, the author caused these picturesque models to be constructed. Side doors invite the theater patrons from the playhouse during intermissions to promenade along the sheltered gravel walk and view representations of places alluded to in the drama. To construct these models cost approximately $10,000.

¶It is stated that the life of a French 75-mm. gun is about 10,000 rounds. All of these pieces at the front have been replaced at least once since the war began.

NEW MOTOR ATTACHMENT FOR BICYCLES

A motor attachment for bicycles which propels by means of a friction wheel has been invented. This wheel



Motor, Which can be Attached to Any Bicycle, Transmits Power through a Friction Wheel on the Rear Tire

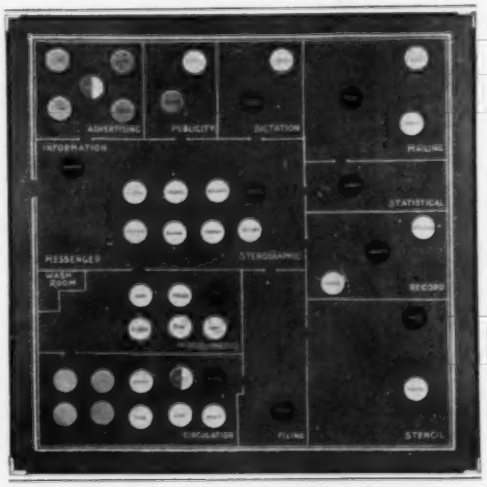
operates by bearing down on the tire of the rear bicycle wheel, and is located at the crank-shaft end of a motor which has its cylinder end pivotally connected to the frame just under the seat. The weight of the motor and the fuel tank increase the pressure on the rear tire. The floating end of the device is kept steady by a coil spring which has at its lower end a turnbuckle that is fastened to the bicycle frame near the rear hub.

SIGNALING DEVICE FOR RESCUERS IN MINES

A simple signaling device for rescue parties in mines has been recommended by the manager of the Illinois Mine Rescue Stations. It consists of a drum in which are placed three dry-cell batteries connected with about 1,000 feet of insulated three-wire cable, which is wound on the drum. The free end of the cable is fastened to a rescuer's belt, and signaling is effected by pressing buttons operating ordinary buzzers. A few feet from the end of the cable is fastened a stout cord with handgrip by which the cable may be pulled along without straining the connections. Other handholds may be fastened at intervals for other members of the party. The apparatus does not weigh over 100 lb. and is much simpler to operate than a telephone.

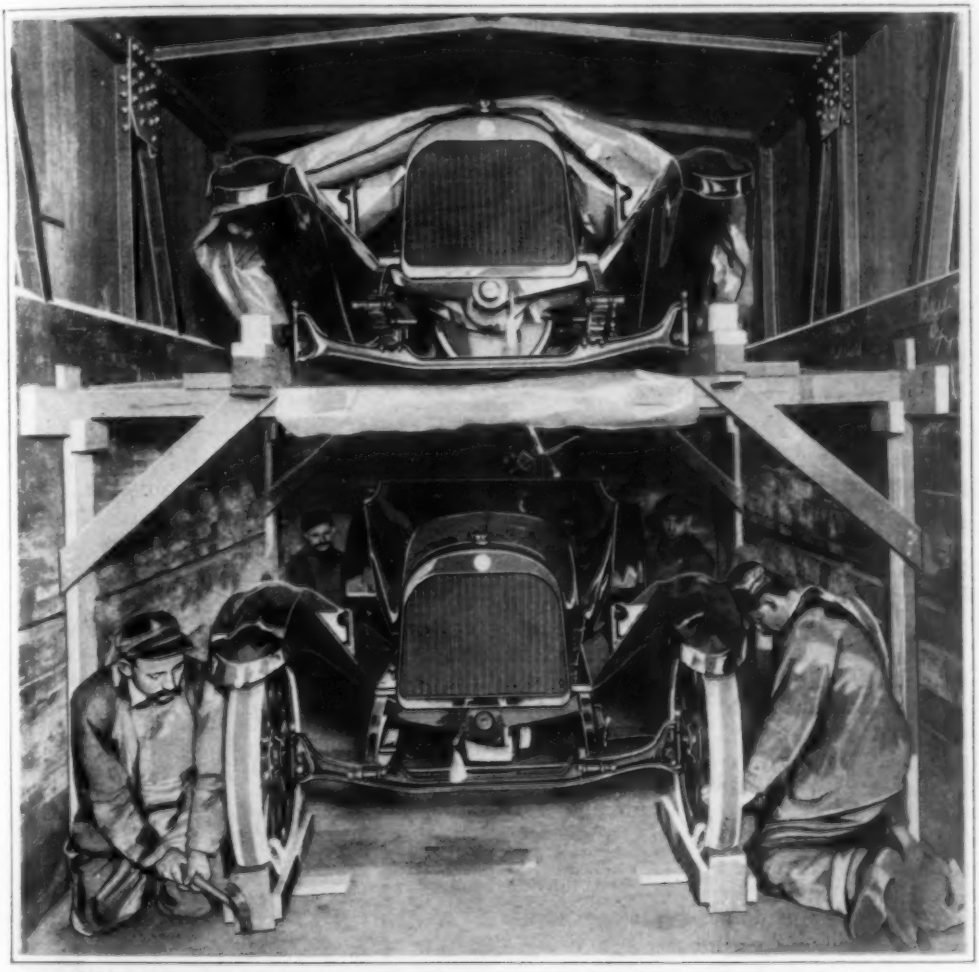
OFFICE "CHECKER BOARD" PROMOTES EFFICIENCY

A device showing at a glance what disposition is being made of an office force is employed by the executive of a Michigan establishment. On the top of an ordinary card table is drawn a plan of the office. Employes and the places where they work are indicated by markers resembling checker men. Men of various colors show various ranks, gold indicating membership in the administrative force, and red a division head; a marker half red and half white shows that the person designated is in line for promotion. The scheme is particularly valuable for use in offices where the force is large and frequently is shifted from one department or duty to another.



With This Device a Business Executive can Easily Keep Track of Office Changes and See How His Force is Divided

LOADING ASSEMBLED MOTOR CARS FOR SHIPMENT

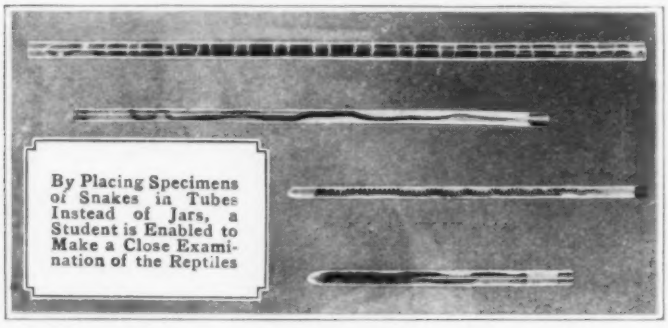


Five Machines of the Size of These can be Loaded into One Car and Shipped without Difficulty: Two are Placed at Either End, as Shown, and One in the Middle of the Car

Very little space is wasted in a railway car when fully assembled automobiles are being shipped to dealers from a factory. Obviously the number of machines which it is possible to pack into one car varies in accordance with their size. Five motors of medium wheelbase, however, can ordinarily be loaded with safety into a single carrier. This is accomplished by placing one machine over another in each end of a car and putting the odd one in the middle. In doing this an automobile is backed into one end of a car and then drawn to the ceiling by means of block and tackle. Its wheels are removed and a stanch staging erected to support it. When it has been securely blocked up and braced, another machine is pushed into the lower space. The wheels are not removed from this vehicle, but are made fast to prevent it from breaking loose during transit. The same procedure is repeated at the opposite end of the car. The body of each machine is carefully wrapped in heavy paper before being shipped, to protect the enamel from scratches.

SNAKES BOTTLED IN TUBES FOR STUDY PURPOSES

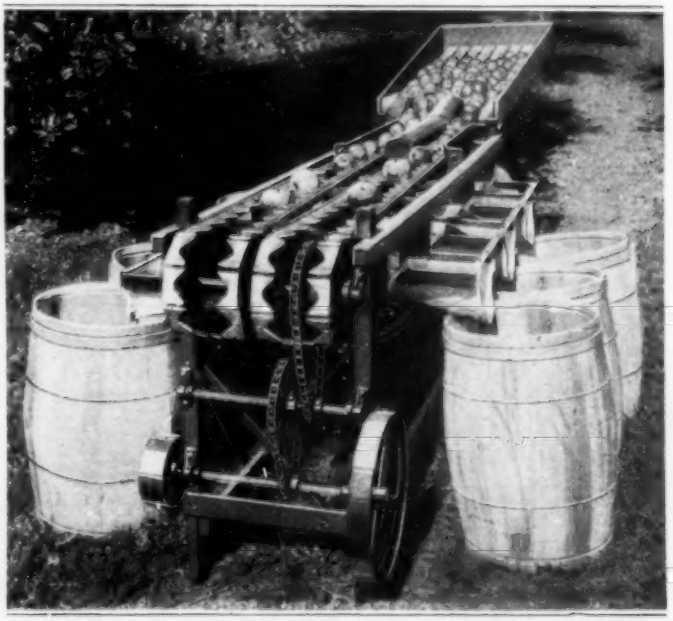
For lecture-room purposes in the biological department of a Florida college, small snakes are preserved in slender glass tubes instead of being coiled in hermetically sealed jars, as is more commonly done. The receptacles are of a diameter only slightly greater than that of the serpent placed within them, and of a length corresponding to the specimen. The advantage of this scheme is that a student is enabled to make a closer examination of the external characteristics of a snake than would be possible were it placed in an ordinary jar. Obviously the tubes cannot be used so successfully for preserving large specimens, but for serpents of suitable size the plan has proved admirable in both the classroom and museum.



By Placing Specimens of Snakes in Tubes Instead of Jars, a Student is Enabled to Make a Close Examination of the Reptiles

APPLE GRADER SORTS FRUIT RAPIDLY

A machine that will grade apples into seven different sizes at the rate of 50 bbl. an hour is now being marketed. It operates on an odd principle. Two chains having links with semicircular inside edges run alongside each other in the same direction. At the end where apples roll onto the chains from a chute the links are close together. But farther along the chains separate, causing larger and larger areas to be spanned by the scalloped edges of the several links. Thus small apples drop through, while the space between the chains is narrow, and the larger sizes are carried farther until the distance between the links widens. This results in an accurate grading of the fruit. Two pairs of chains are ordinarily mounted in the same machine to increase the capacity. In commercial orchards the sizing of apples has become a big factor and hence the demand is great for machines of this character.



This Machine Sorts Apples at the Rate of 50 Barrels per Hour

GERMANY TRYING TO SAVE ALL HER COPPER

A circumstance, which would seem to indicate that there is a lack of copper in Germany, attended the transfer recently of some locomotives purchased by a Norwegian railway from German contractors. The latter first demanded, it is said, that the locomotives should be exchanged for copper. This the purchasing company declined to do on account of export restrictions. It was then suggested, according to the report, that an equal quantity of copper to that used in the locomotives should be returned. This request being denied, the manufacturers proposed that the whole amount of the purchase be paid in copper coin. The company refusing, the locomotives were reluctantly delivered against ordinary payment.

SMALL METAL ARTICLES LACQUERED IN BULK

Certain large corporations which have quantities of rings, buckles, and other metal accessories which are liable to corrosion, have found it profitable to give these articles a cheap coat of lacquer. The method employed is to secure two oil drums, one of which is smaller than the other. One head is removed from each drum, and a number of ½-in. holes punched in the bottom and sides of the smaller drum. Into the larger drum is poured a mixture of one part cheap varnish and one or two parts denatured alcohol. The articles are then placed in the perforated receptacle and immersed in the preparation, after which they are withdrawn immediately. By placing them on a draining screen for 15 minutes they are ready for use. The thin coating is scarcely noticeable.

SAFETY ATTACHMENT FOR LAUNDRY MANGLE

One of the safety features of the laundry in the new $4,000,000 hospital in Cincinnati is a guard for the mangle.

With This Guard in Place Practically All Danger That the Fingers, Hands, or Sleeves may be Drawn into the Machine is Eliminated

This device is so designed that it makes practically impossible the distressing accidents that sometimes occur with these machines when they are not guarded. It consists simply of a small steel fence mounted in front of the big roller and running the full length of it, and with this guard in place all danger that the worker in a moment of carelessness may have the fingers, hands, or sleeves drawn into the machine is practically eliminated. The linen is passed into the machine through the space under the guard.

TYPEWRITER DESK IS AID TO RAPID WORK

A typewriter desk lately marketed is especially designed to facilitate rapid dispatch of routine work. In the center, as with the ordinary desk, is an open space for the typewriter. Flanking it on either side, however, are pigeonholes and a number of other conveniences within unusually easy reach of the operator. At the left is a receptacle for work to be done, and

just beyond it a small bracket supports a desk phone ready for immediate use. In the back of the cabinet are more pigeonholes, these being in a

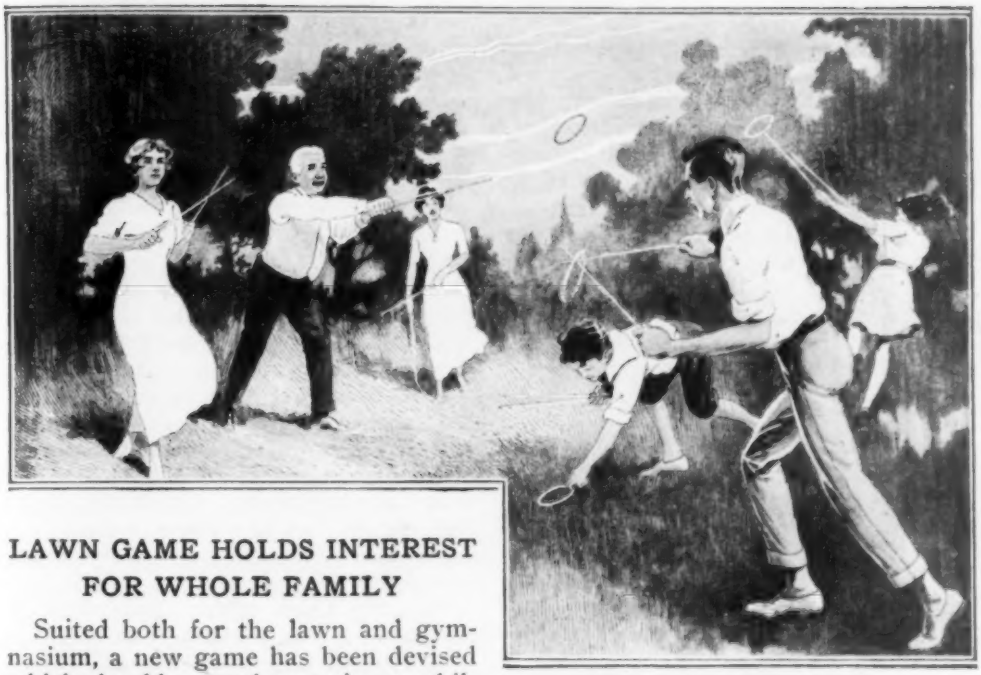
A Copyholder, a Bracket for the Telephone, Especially Arranged Pigeonholes, and Drawers of Unusual Design are Features of This Convenient Desk

vertical position and capable of holding ordinary-sized letterheads, and legal forms. Directly above the typewriter a copyholder aids the operator in rapid transcribing of copy. At the extreme right is a shelf for finished work, while underneath are drawers and additional compartments which may serve the same purpose. When not in use the rear portion of the desk and the sides fold in, making a cover for the typewriter and stationery.

PHOTOGRAPH STUDIO HAS DETACHED SHOWROOM

A California artist, who for esthetic reasons built his studio about 30 feet back from the sidewalk, soon found that passers-by were reluctant to take the necessary additional steps to view his window display. Consequently he devised a separate structure to house samples of his work. This was built of brick, flush with the sidewalk, measuring 10 by 11 ft., by 10 ft. high. In style it conforms with the front of the studio and consists of a lobby having a beamed ceiling and open on three sides. The fourth side, that nearest the studio, contains inclosed display space, the side of this inclosure facing the street being of plate glass. Access to the display for the purpose of changing photographs, and the like, is gained through a concealed door at the rear. This novel and artistic method of displaying photographs has attracted much attention to the artist's studio.

Photograph Studio Placed Back from Street and Easily Accessible Showroom, Built Flush with the Sidewalk, to Attract Passers-By



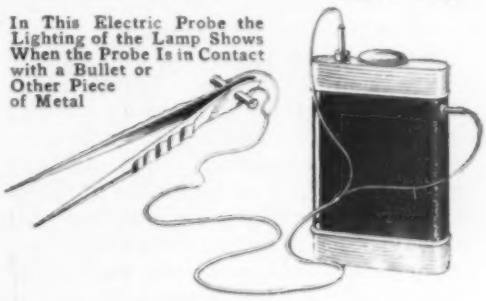
The New Game is Suited Either for the Lawn or Gymnasium, and Therefore Is Just as Interesting in Winter as in Summer

LAWN GAME HOLDS INTEREST FOR WHOLE FAMILY

Suited both for the lawn and gymnasium, a new game has been devised which should prove interesting to children, and more or less entertaining to some of their elders, as it furnishes mild exercise and requires a certain amount of skill. The outfit is simple and inexpensive, consisting merely of four light rods, or pointers, and a hoop, 7 in. in diameter. Each of the two players uses a pair of rods, and one, placing these implements through the ring and crossing them, throws the hoop through the air to his opponent by a quick, spreading motion which separates the pointers and projects the former. The other player, holding the points of his sticks together, is supposed to catch the ring. When it is sent through the air in a perpendicular position and caught on both rods, one point is scored. Catching it with only one stick counts nothing, while if it is missed the player forfeits a point. If the ring is thrown in a horizontal, or flat, position, one point is made, even if the catch is made with only one rod, while failure to do this does not count against the player. When the hoop turns on its axis during its flight the pitcher forfeits a point. In case it is not caught, the other player loses nothing, but by catching it with both rods receives two points, or one credit if a single stick is used. A total of 24 points comprises a game.

SIMPLE ELECTRIC DEVICE FOR PROBING WOUNDS

An electric probe that commends itself through its simplicity and ease of handling has just been invented by a German surgeon. The entire apparatus consists simply of an electric pocket lamp from which insulated wires lead to the two legs of a pair of

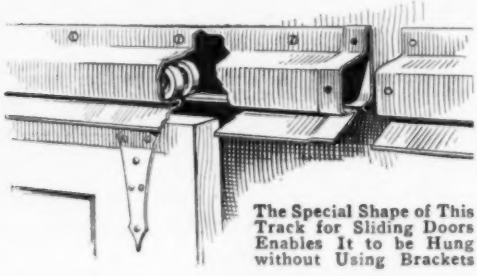


In This Electric Probe the Lighting of the Lamp Shows When the Probe Is in Contact with a Bullet or Other Piece of Metal

pincers used in probing the wound. When the pointed legs of the pincers touch a bullet, a fragment of shrapnel, or other piece of metal, an electric circuit is formed through it and the lamp is lighted. One of the great advantages in this device is that it can be carried in the pocket and used in the field without the preparations usually required with other devices. Another device, based on the same principle, shows by the deflection of a needle not only when the probe is in contact with the bullet, but when it is approaching or receding from it.

TRACK PROTECTS SLIDING DOOR FROM WEATHER

A new track, designed to protect as well as support a sliding door on barn or garage, is being marketed. It consists of two sheet-steel stampings so formed and riveted together that a track of sturdy construction is produced. Between the stampings, on ridges made in the metal, the trolleys supporting the door ride. Since the various sections of the track are fitted together with lap joints, the entire runway where the trolleys travel is protected from the weather at all times. This is in contrast to the way ice and sleet sometimes make a door inoperative in winter weather, when ordinary track is used. No brackets or joint splices are necessary in erecting this runway, since the stampings are nailed, or screwed, directly to the surface of the building. The outer part of the track is especially shaped to keep water from running down onto the upper edge of the door and rotting the wood.



The Special Shape of This Track for Sliding Doors Enables It to be Hung without Using Brackets

NEW TEST FOR MOTOR-CAR LIGHT DIMMERS

A test of light dimmers for motor cars was made recently by a Massachusetts automobile club to ascertain what devices come within the requirements of the new state law. This law specifies that motor lights shall not dazzle or glare 3½ ft. above the ground or 50 ft. ahead, but shall reveal clearly objects 150 ft. ahead and also at the sides. For the test, lights were mounted on a stand at the end of a darkened room, 140 ft. long. At either side of an imitation roadway, and 10 ft. in front of the lights, were stationed figures representing pedestrians. Just 50 ft. in front was a crossbar, 3½ ft. high. At the far end of the room were other figures to represent pedestrians. The consensus of opinion was that many commonly used dimming devices do not comply with the new requirements, which demand a lamp that will throw a broad, low-sweeping fan of light far ahead. In several cases the devices tested removed the glare and lighted sufficiently objects at the roadside, but failed to reveal the figures in the road 150 ft. ahead. Others showed clearly the distant objects but were too dazzling. Lenses, all frosted, were sufficiently subdued but lacked range. The club will test other devices from time to time.

RUBBER FILTER RINGS HAVE SPECIAL ADVANTAGES

Rubber rings for holding filtering crucibles in such a way that practically the entire side and bottom of the crucible are unobstructed, as is often desired by druggists, chemists, etc., have been placed on the market. They are made in two styles and will fit any 60° funnel. The plain ring is of hard rubber so designed that it grasps only

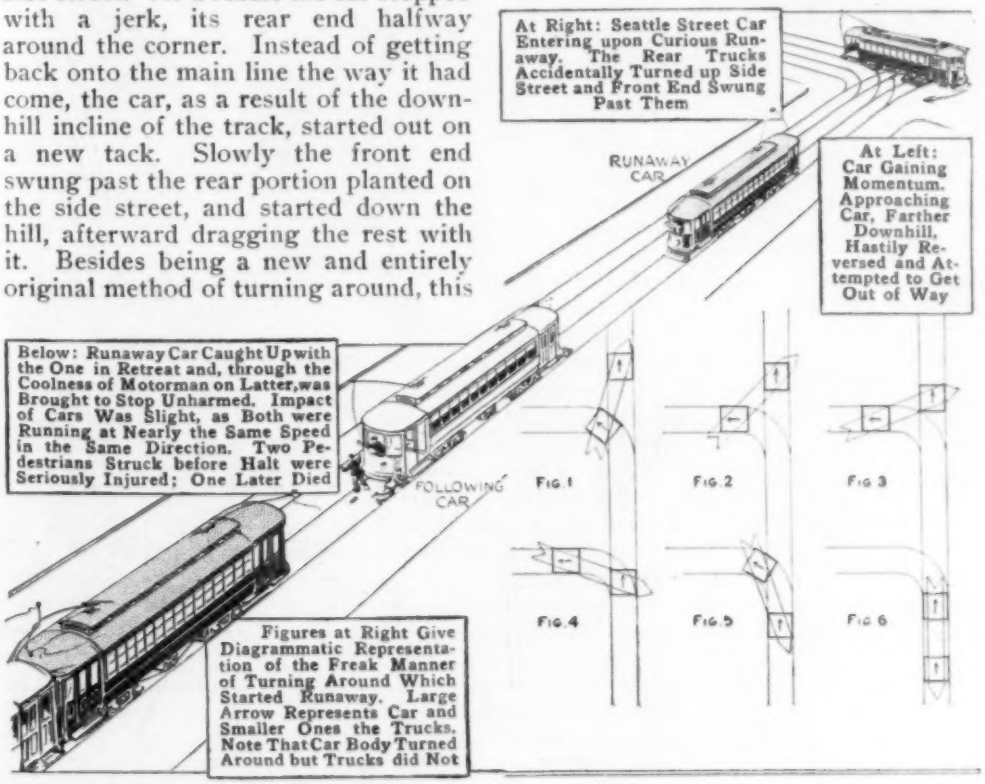
about one-eighth of an inch of the upper edge of the crucible set into it. The other type is similar to the plain style, but its hard-rubber ring is supplemented by soft-rubber flanges which can be replaced. The illustration represents the latter type.

RUNAWAY CAR PERFORMS CURIOUS FEATS

A street car took a leading part in an odd runaway in Seattle recently. Plenty of adventure resulted from the impromptu excursion. Before events reached an end one man had been struck and fatally injured, another severely bruised, and a collision with a second car full of people narrowly averted.

The accident happened at the top of a hill. In passing over a switch the car's front trucks went properly up the main line, while, for some reason or other, the rear pair turned off into a side street. As a result the car stopped with a jerk, its rear end halfway around the corner. Instead of getting back onto the main line the way it had come, the car, as a result of the downhill incline of the track, started out on a new tack. Slowly the front end swung past the rear portion planted on the side street, and started down the hill, afterward dragging the rest with it. Besides being a new and entirely original method of turning around, this action had a most disastrous effect on the brakes and other appliances beneath the car which might have been capable of stopping the runaway. At every turn of the wheels, the car ran faster. A motorman on an approaching car, seeing the runaway, promptly reversed and attained some speed in a backward direction with a view to lessening the approaching impact. At the moment when the runaway caught up with the backing car, both were running at nearly the same speed, hence the collision became but a slight jar. Upon applying brakes to the car under control, both were speedily brought to a stop. The motorman's quick wit had averted a serious collision, but did not prevent injury to two people who were unable to get out of the way of the racing cars. One of these later died.

¶One of the specialty plants in this country turns out 5,000,000 steel balls for ball bearings every 24 hours.



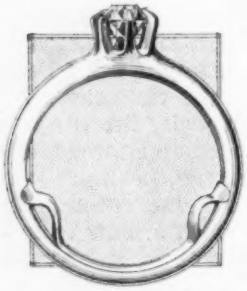
At Right: Seattle Street Car Entering upon Curious Runaway. The Rear Trucks Accidentally Turned up Side Street and Front End Swung Past Them

At Left: Car Gaining Momentum. Approaching Car, Farther Downhill, Hastily Reversed and Attempted to Get Out of Way

Below: Runaway Car Caught Up with the One in Retreat and, through the Coolness of Motorman on Latter, was Brought to Stop Unharmed. Impact of Cars Was Slight, as Both were Running at Nearly the Same Speed in the Same Direction. Two Pedestrians Struck before Halt were Seriously Injured; One Later Died

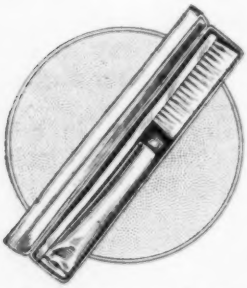
Figures at Right Give Diagrammatic Representation of the Freak Manner of Turning Around Which Started Runaway. Large Arrow Represents Car and Smaller Ones the Trucks. Note That Car Body Turned Around but Trucks did Not

NOVEL AND PRACTICAL THINGS FOR THE HOME



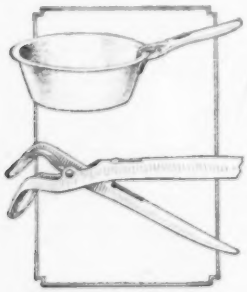
Ingenious Ring Guard Hidden When Worn

BESIDES being comfortable and conforming to the shape of a finger, a new type of ring guard lately devised is concealed from view when worn. It is made of gold and fits securely to the inner rim of a circlet, pressing against the fleshy part of the finger and preventing the ring from turning.



Compact Case for Toothbrush and Paste

Among the new toilet accessories is a short-handled toothbrush and a small tube of paste neatly packed in an attractive silver case. The compactness of the article allows it to be carried conveniently in a woman's handbag, should this be desired. When traveling, it occupies a minimum of space in a toilet case.



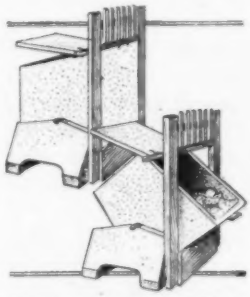
Auxiliary Handle Used with Saucepans

Trouble and burned fingers are both materially lessened by the use of an auxiliary handle which may be employed when preparing food in saucepans and baking dishes. It clamps to the wall of a vessel and may be locked in place, or not, as is desired. It holds securely, and if properly applied will not crack enamel ware.

Silver baskets garnished with artificial greenery, in the midst of which are clusters of black-headed pins that look like large, luscious loganberries, form attractive pincushions for a lady's dressing table. These are being shown in different patterns and in sizes varying from approximately three to five inches in height. After the pins have been used the cushion may be removed and the basket filled with bonbons or almonds.

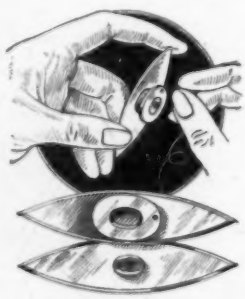
Pincushion Looks Like Basket of Berries

Large, durable garbage receptacles constructed of reinforced concrete are being manufactured for general use. They are mounted on concrete blocks and may be easily tilted to an inclined position to facilitate the removal of their contents. When a square opening is cut in a back fence and the device properly installed, the box may be tilted through the space and the refuse taken out from the alley side.



Garbage Receptacle Made of Heavy Concrete

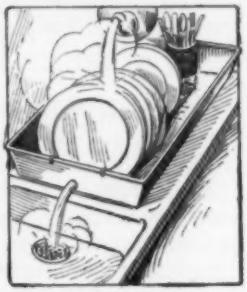
Real convenience is embodied in a new tatting shuttle, lately introduced, which is made in two parts. This arrangement permits the device to be opened and thread wound about its



Convenient Shuttle Made in Two Parts

spool without any difficulty whatever. The two sections are held together by a telescoping, oval spindle, the shape of which prevents oscillation and keeps the points in alinement.

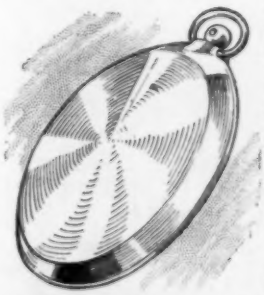
For domestic purposes a dish drainer and drying rack has been brought out which consists of a sheet-metal pan fitted with a frame for china and a wire receiver for silver. A hole in one end of the pan allows hot rinsing water to drain into a sink. Its chief advantage is that it catches the water as it is poured over the dishes, preventing it from slopping onto a floor, and also permits the drainer to be moved without dripping the water.



Dish Drainer and Drying Rack for Kitchen

So that a rug may be gone over without moving heavy furniture, such as a davenport, couch, or music cabinet, an extension nozzle is provided with one type of vacuum cleaner. This enables the operator to reach out-of-the-way places without bending into uncomfortable positions, as is usually necessary, when the task is attempted with a broom.

Extension Nozzle Used with Vacuum Cleaner

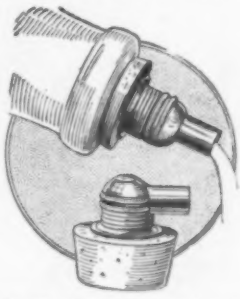


Bed Warmer Radiates Heat throughout Night

Dry, even heat is radiated for 12 hours or more by a metal, disk-shaped bottle which may be employed as a bed warmer. The device is 8 in. in diameter, 1¼ in. thick, and weighs a trifle more than three pounds. It is filled with a heat-retaining chemical and is intended to be placed in boiling water for a period of about 10 minutes before being used. It is not meant by this, however, that water is filled into it.

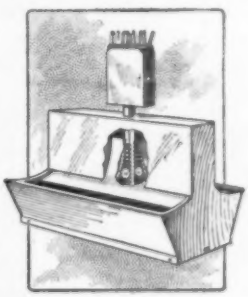
Dishwasher Brush of Simple Construction

In an attempt to simplify dishwashing without resorting to a large and expensive machine, a dish brush has been developed which may be connected with a rubber tubing to a hot-water faucet. It is provided with a soap chamber through which water passes before being discharged through the bristles. A spray of clear, hot water is produced by pressing a button in the handle.



Air-Tight Stopper Designed for Milk Bottles

For milk bottles an air-tight stopper has been invented which is intended to be inserted after the customary pasteboard cover has been removed. It consists of a ball-valve spigot mounted in cork.



Combination Match Stand and Ash Receiver

A match stand and tray lately designed has sliding leaves on either side which permit cigarette and cigar stubs to be discharged into the interior of the receptacle. By pushing down upon the match holder the leaves are moved back and ashes dropped.

COMBINED WATCH AND SHELF CLOCK FOR SOLDIERS

A novelty being offered the English trade consists of a watch designed particularly for soldier use. The watch

English Watch for Soldiers in Trenches Tilts Up on Inner Hinge for Use as Shelf Clock. Nurses Use Another Type Having Pulse Second Hands

proper is oval in shape and is mounted within a metal case of durable construction. By opening the cover and raising it on an interior hinge it is possible to tilt the watch at an angle and set it on a table or shelf where it may be made to serve in place of a clock. The timepiece has self-luminous hands and numerals. As presents for soldiers in the field, these watches have attained some popularity. Another watch of the wrist variety, having pulse second hands, is also being offered for the use of doctors and nurses.

PICTURE PRODUCERS ERECT PLATFORM FOR VISITORS

In southern California an unusual industry has sprung up, the wholesale production of motion pictures. The principal reasons for this are the wonderful variety of natural scenery found in the region and a climate noted for its brilliant sunlight. Hundreds of visitors intent on seeing motion-picture actors actually at work flock to the district each month, and the handling of these proves a considerable problem.

One of the companies which allows visitors has adopted an innovation of some interest. Opposite a 300-ft. stage upon which the actors are performing, an observation platform has been erected. Visitors are permitted to

Observation Platform at California Studio Enables Visitors to See Motion Pictures in the Making

gather on this and watch the various scenes being filmed. Thus the strangers' innocent venturing in upon property rooms, scenery departments, camera quarters, or the stage, is prevented, and at the same time their interest and curiosity satisfied. The lower portion of the observation platform, which is of cement, serves as a convenient dressing apartment for the actors.

SHORTER RAILS NOW USED BY RAILROADS

The use of shorter rails seems to be a general tendency among American railroads at the present time. There are, however, a few conspicuous exceptions to this practice. Pronounced variations in temperature causing excessive expansion and contraction are the chief reason for preferring the shorter rail. Formerly a number of steam lines laid rails 60 ft. long, but many of these have been supplanted with much shorter material. In one instance 60-ft. rails were taken up and cut in two and then relaid. Rails 33 ft. in length are commonly used. Several lines have recently placed orders for 39-ft. rails and one road has specified 40 ft. for new rails. The usual length of rail now used in England is 45 ft., though one of the leading roads of that country uses 60-ft. rails. A railway in northern France is said to be laying rails 78 ft. 9 in. in length.

REVOLVER IS MOUNTED IN END OF POCKETKNIFE

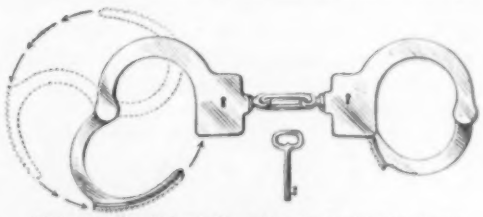
A novelty of recent appearance combines the functions of a revolver and pocketknife in one article. One end of the invention resembles an ordinary jackknife, having the usual hinged blades of assorted sizes. In the other end, however, is mounted a steel block, bored out to receive a .22-caliber cartridge, either blank or ball. Attached to the back of the knife is a suitable trigger arrangement for firing the cartridge. Though intended primarily for emergency use, and to avoid the necessity for carrying a heavier gun, the contrivance is also a convenient accessory on hunting and fishing trips.

Combined Jackknife and .22-Caliber Gun

Several different styles are manufactured.

HANDCUFF STAYS OPEN IN POCKET

A handcuff, designed to prevent accidental locking when carried around in a coat pocket, is a recent invention. Means are provided for adjusting the "bracelets" to different-sized wrists as in the ordinary handcuff, but the shackles cannot become locked except



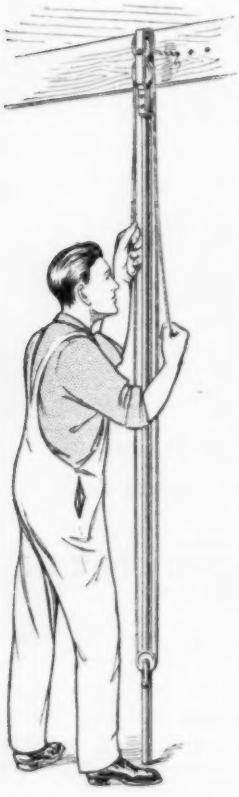
This Handcuff Is Adjustable, but will Not Lock Accidentally

upon deliberate intention. Thus the cuffs are always open ready for instant use.

¶British authorities have denied that British motorcyclists are used in the war as scouts. The 15,000 motorcyclists in the British army are all dispatch bearers, it is said.

BORING MACHINE IS HELP IN HOUSE-WIRING WORK

In house-wiring work boring holes in ceiling supports to permit the passage of a wire is a slow and tiring task. Many machines have at one time or another been devised to make this work easier. A late one consists of an upright rod extending from floor to ceiling and having at its upper end the usual chuck for holding a bit. The method of operating this is interesting. It is done with the aid of a rope passing over pulleys connecting with the upper chuck. The operator seizes two handles connecting with this rope and works them up and down, a ratchet arrangement forcing the bit into the wood at each pull. With such a tool, work may be done more quickly and in greater ease than with the ordinary brace and bit.



WAR MOTOR CARS DIPPED IN PAINT BATH

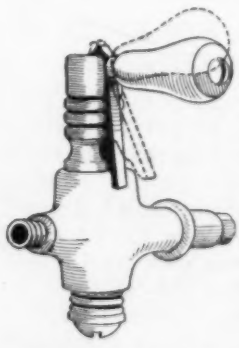
The exigencies of the war in Europe which demand speed in production have resulted in the employment of a method of painting motor trucks which turns out several hundred vehicles a day with small labor expenditure. To give the motor trucks, motorcycles, etc., used at the front the desired gray or khaki hue they are lifted bodily by a heavy crane and immersed for a few minutes in a paint bath. Tanks holding hundreds of gallons of paint are provided for the purpose. Of course the coating so administered is much inferior to that put on by brushes, and it peels off much more readily, yet for war purposes it seems to be satisfactory. Motors and other delicate mechanism are installed after the bath.

WHY EVEN BEST WATCHES GO WRONG

The reasons for variations in the time-keeping qualities of a well-regulated watch have been the subject of investigation by scientists recently. The popular theories, often circulated by jewelers and other tradesmen, that animal magnetism and bodily temperature are causes, are denied by these investigators. Rather, different rhythms of movement as well as the angle at which a watch hangs are given as real causes for irregularities. It has been found, for example, that a watch so accurately adjusted that, when worn by its owner, it will not vary more than a second a day, will gain or lose a quarter of a minute in 24 hours if hung on a bedpost.

ACCIDENT-PROOF GAS COCK FOR STOVES AND RANGES

Designed for safety purposes, so as to minimize the danger of the gas being turned on accidentally in a gas range, a cock has been made which automatically locks when it is closed. This prevents the knob from being moved and a flow of gas started by a person unconsciously brushing against it. Until it is raised so that the lock is released, the handle cannot be turned. This causes no inconvenience and gives assurance against accidents.

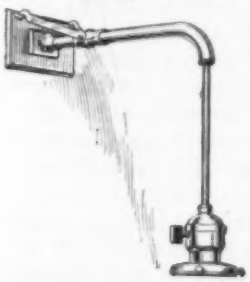


MINE EXPLOSIONS PROVEN TO BE PREVENTABLE

That mine explosions from ignition of gas are something which cannot be guarded against and hence may be considered as "acts of Providence," is now generally regarded as a false assumption. The mines of Belgium are striking illustrations of the advantages of carefulness. There sudden outbursts of inflammable gas are frequent, and yet there have been no serious explosions from ignition of gas for the past 20 years, though prior to 1893 when less precaution was observed, there were many great disasters. It is stated that without open light of some sort there would be no explosions, and British statistics indicate that 90 per cent of the explosions or inflammations have occurred in what are called open-light mines, designated as "nongaseous."

REMOVABLE BRACKET FOR SPECIAL LIGHTING

A removable lamp bracket which is particularly adapted for use in hotels where it is desirable to furnish strong lighting in sample rooms, has been manufactured by an eastern concern. This bracket is made to fit into receptacles of the disappearing type, so that when the lights and brackets are removed, the sample room is no different in appearance than the other rooms. The receptacles are equipped with special eyelets to receive the hooks of the brackets. Even if the receptacles are not covered up while not in use no exception can be taken to their presence. Similarly constructed receptacles, located at the head of a bed, have proven convenient for a bed-reading light and permit the light to be removed easily.



ELECTRIC WATER HEATER IS BUILT FOR FOUNTAIN USE

An electric water heater, designed particularly for the use at soda fountains, is a late addition to the list of

Electric Water Heater Assists Fountain Proprietors in Serving Hot Drinks at All Times. Coil of Wire in Base Provides Heat as Required

electric appliances now on the market. It consists of an upper glass globe which opens up into a well. This is situated within a pyramidal frame forming the base. Here the coils of wire providing the heat are located, which is a point of vantage because of the fact that the faucet opens directly out of the well and the close proximity of the heater always assures hot water on demand. Two rates of heating the water are made available; one a "low" and the other "high." A pilot lamp in the base indicates by its degree of brightness which is on at a given time. The low heat consumes about 95 watts, while the high takes 660 watts.

¶What is said to be the longest salmon-canning season in a decade on the Fraser River, B. C., came to a close recently with a total salmon pack of 1,132,201 cases, an increase of more than 20,000 cases over 1914.

HOW THE BENGALESE ARE TOLD THE NEWS

The language spoken in Bengal is a modern Indian tongue somewhat resembling Sanskrit, and is written in an

ঢাকাই সংবাদ।

আমাদের সংবাদদাতার পত্র।)

মানহানির মোকদ্দমা :—

ঢাকার অতিরিক্ত জেলা ম্যাজিষ্ট্রেট মিঃ ওয়াডেল মহোদয়ের এজলাসে ভারতবর্ষীয় দণ্ডবিধি ৫০০ ধারানুসারে একটী মানহানির মোকদ্দমা রুজু হইয়াছে। এই মোকদ্দমায় অত্র জেলার মুন্সীগঞ্জ মহকুমার সাবডেপুটী শ্রীযুত পূর্ণচন্দ্র দাস বাদী এবং শ্রীরমণ সাহা বিবাদী। অভিযোগের বিবরণ এই—রেকাবী বাজারের হরিদাস গোপ পূর্ণবাবুর এজলাসে রমণের বিরুদ্ধে এক অভিযোগ দায়ের করে। আসামী এই মর্ম্মে এক এফিডেবিট করে যে বাদী পক্ষ বিচারের পূর্ব্বেই উক্ত পূর্ণবাবুকে ঘৃত এবং ক্ষীর উপঢৌকন দিয়াছে। এরূপ অবস্থায় পূর্ণবাবুর নিকট মোকদ্দমার শুনানী হইলে তাহার

Reproduction of a News Item That Appeared in a Recent Number of "Darshak," a Journal Printed in the Bengali Language and Published at Calcutta

alphabet known as Nagari. Like all the languages of the Orient, it has a strange and incomprehensible look to an English-speaking person, as will be seen from the accompanying reproduction of a news item taken from "Darshak," a journal published in Calcutta. The name Bengali is English. The Bengalese call the language Banga-Bhasa. It is the native tongue of Rabindranath Tagore, one of the winners of the Nobel prize in literature, who writes both in this language and in English.

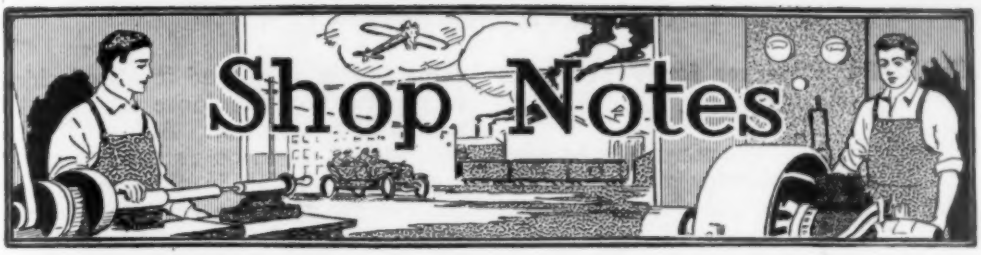
NEW PROCESS OF MAKING ELECTROLYTIC IRON

The production of sheets and tubes of electrolytic iron by a process in which ordinary cast iron serves as a basis and the product consists of iron in a very pure state is being perfected in France. The cathode rotates in a solution of ferrous salt so as to have a layer of iron deposited on the surface. The solution is kept neutral by placing iron turnings in the bottom of the tank and by adding oxide of iron as a depolarizer. The iron thus produced is very hard at first and contains some gas, but it is then annealed so as to expel the gas and make a soft, malleable metal. By using a rod as a core, iron pipe can be made direct, but the making of sheet iron is not yet in a commercial stage, though it is expected to produce sheets of soft, pure iron without rolling.

HIGHWAY PRODUCE MARKETS FOR MOTORISTS

The elimination of the middleman and some reduction in the cost of living have been accomplished by resourceful farmers in the East and elsewhere through the wayside markets which they established during the past season, for the patronage of motorists. Simple shelters of various styles were built along popular highways, housing all sorts of fresh vegetables and, in some cases, also butter, eggs, and fruit. Because there was no cartage and because the produce was sold directly to the consumer the prices often were less than in retail stores. One farmer displayed his fruit in small baskets and placed above it a sign which read: "10 cents a basket. Take your pick and put your money in the box." Another farmer is said to have taken in $16? in one day.

¶In testing shrapnel shells they are subjected to a temperature of 120° F. for 24 hours. In one of the government arsenals this has been done in an electric furnace whose temperature is controlled by a thermostat. Arcing has been reduced to a minimum by a condenser shunted across the contacts. The heat variation in a 24-hour test was not more than one degree, it is claimed.



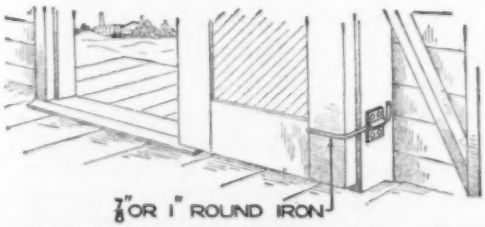
Accuracy of Levels

It is really surprising how accurate one can be with a good level. With a first-class level, made of cast iron and having a graduated bubble glass, an erecting contractor would think twice before passing the job of installing a piece of machinery or lining a shaft if the bubble showed $\frac{1}{32}$ in. off center. Yet, in a level only 18 in. long, the bubble would indicate that one end was .001 in. higher than the other. Realizing this, it is little wonder that the ways of large planers and lathes are leveled up with an accurate level as recommended by the manufacturers.

Holding Large Doors Open

Large and heavy shop doors are, when caught by sudden gusts of wind, about as dangerous as anything around the establishment. A good many ways are employed to hold them open, but a strong wind readily tears a heavy door free from its anchor.

The illustration shows how a cheap, practical, and simple lock-open arrangement can be made from a piece of $\frac{7}{8}$ or 1-in. round iron. It is capable of holding a door of considerable size



Holder Made of a Rod to Keep a Large Door Open against a Strong Wind

open, no matter how strongly the wind blows, and on account of its shape it will not break loose.

Beaching a Motorboat

The device shown consists of a piece of 3-in. pipe, about 18 in. long, placed so that it will revolve on four inverted casters which are screwed to a board.

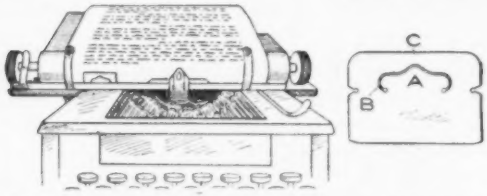
Inverted Truck Casters Placed on a Plank in Position to Hold a Length of Pipe

When the boat has been run aground, the device is placed under the keel, and the boat is pushed by hand until the entire length of the keel has traversed the roller. The device is again shifted forward and the process repeated until the boat is high and dry. If two sets of rollers are used the process is considerably easier. The outfit is small and can be readily carried in the boat for use wherever it is desired to beach it.—Contributed by J. J. O'Brien, Buffalo, N. Y.

¶To make a first-class oil for light machinery, take a bottle about half full of pure olive oil, place in it some thin strips of sheet lead, and expose it to the sun's rays for a month, then pour off the clear oil.

End-of-Page Marker for Typewritten Sheets

Many typists have often felt the need of a page-end indicator to enable them to see when the bottom of the page being



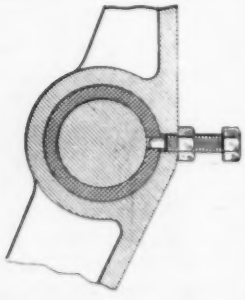
Indicator Made of Celluloid to Fasten on Page End of a Typewritten Sheet

typewritten is approached. Such an indicator can be made of thin celluloid, the celluloid cards given out as advertisements being suitable for the purpose. The celluloid is cut out, as shown, and bent back at the notches at the sides.

To operate, the page is started in the typewriter, and the edges of the indicator are pressed together between the fingers. If properly made, the indicator will give a click as the flap A bends through the opening B. The indicator is then slipped over the end of the page, with the flap A facing the typist. This sounds complex, but is in reality very simple. The edge C may be colored red to catch the eye as it appears.

To Hold a Loose Camshaft Bushing

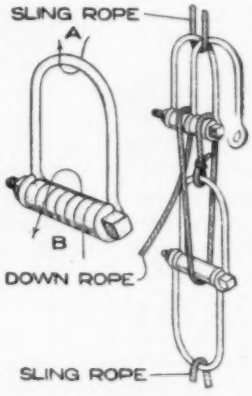
The bushings within which the camshaft of a gasoline engine rotates are in quite a few cases merely pressed into



the aluminum crank case, and constant vibration, together with a difference in expansion of the bronze and aluminum, has in many instances caused the bushing to come loose. In such cases a new bushing would probably be the best solution. A similar case came to our shop, and it was decided to try holding the loose bushing by means of a setscrew. A ¼-in. screw was turned down on the end to make a projection 3/16 in. in diameter and of such length that the end came 1/64 in. under the inner surface of the bushing. The screw was held with a lock nut, as shown.—Contributed by Adolph Kline, New York City.

An Emergency Pulley Block

In an emergency, where I had to lower a large sheave wheel a distance of 50 ft. from its bearings, I used blocks made up as shown in the illustration. Clevises taken from a doubletree of a wagon were formed into pulley blocks by filling the pins between the yoke ends with washers. The rope was tied through the clevis, at A, as shown by the arrow, and the down rope, as at B and to the sheave wheel, the opposite end being given a couple of turns around a cross timber. The washers revolved on the bolt like a small wheel. A double block can be made with four of the clevises, as shown.—Contributed by E. C. Lane, El Paso, Tex.



Receptacle for Motion-Picture Film Cement

Take an ordinary oil, or sewing-machine, can with an opening in the spout not over 1/16 in., and put the cement in the can. When wanted, press the bottom as in oiling and draw the spout along on the edge of the film to be patched. The can not only saves time for those engaged in film rewinding, but also prevents evaporation of the cement.—Contributed by Geo. Yaste, Lonaconing, Md.

Things to Know about Fiber

Fiber in sheets, tubes, rods, and special shapes, plays an important part in mechanical work at present. It is an insulating substance and finds a large field in electrical work. It withstands the action of oil very well, and has another field in friction surfaces of machines, where a material is needed that is substantial enough to transmit power but at the same time smooth and true enough to slip under great pressure without cutting the metal faces. For this purpose it is a rival of bronze.

Fiber is also supplanting hard rubber for handles, ferrules, and special shapes. For this work it is as light as rubber and has the great advantage of not being brittle, for which reason it can be handled by unskilled labor and applied in places where rubber cannot be used. Manufacturers of fiber will supply special shapes, such as grips for bicycle handlebars.

Gears are also made of fiber. The rawhide and cloth gears are noiseless and have good wearing qualities, and the same may be said of fiber gears, the wearing qualities of the latter being somewhat better. In a certain leather-manufacturing plant a tanning apparatus was driven by a 6-in. cast-iron pulley on a motor driving a 24-in. cast-iron gear. The pinion had to be renewed every four months and the gear every year. Rawhide, bronze, and cloth pinions were tried, and while they stopped the noise, they did not wear much better. A fiber pinion, after running 32 months, appears to be good for as many more months.

Fiber can be worked at high speed in lathes, milling machines, saws or drills, but in drilling out rods of fiber trouble may be experienced. This is due to the nature of the material. All of the so-called hard, or red, fiber is made of sheets of cloth, chemically treated and subjected to great pressure, which almost, but not quite, unites the sheets. In drilling rods, this little lack of union asserts itself, and unless the hole is comparatively shallow and small, the rod is apt to split along the line of the original sheets. If a rod is threaded with a die, the same trouble is encountered; in fact, it is well-nigh impossible to cut such a thread, due to the spreading and twisting strains set up by the die.

Hinged Fireplace Screen

Ordinarily a fire screen is not fastened to the fireplace and is open to the objection that through forgetfulness one may neglect to return it to its place after attending to the fire. Where there are small children about, this is dangerous because of the chance of their

A Hinged Fire Screen That cannot be Forgotten and the Fire Left Unprotected

meddling with the fire and getting burned. However, if the screen is hinged, as shown, its unsightly appearance when raised will cause it to be lowered as soon as possible after the fire is fixed.

¶To run a tap into a hole in hardened metal, even if it can be scratched with a file, will many times ruin the tap.

Modern Barn Construction

By W. E. FRUDDEN

THE framing of a barn has gone through an evolution in which the heavy timber barns of former years have passed out of existence, and trussing has taken the place of the large beams that have become exceedingly expensive. The first truss illustrated is for a standard-width barn of about 36 ft., and is, both in materials and labor, very economical. It gives a maximum of storage room in the mow; it is convenient, and will give the most space and best barn for the money.

The joists in this design are the heaviest pieces of timber in the whole frame, 16 ft. being the longest dimension required. Barns like these are stiff, safe, sound, and serviceable for a great number of years.

The scarcity and the poor quality of the long timbers that can be had now make this plan of construction very sensible, as it uses only short lengths of 2-in. planks. In the old timber barn, the mortise-and-tenon joints are the weak places in the building. They are not nearly as strong as they appear. It takes skill and a great deal of experience to master the art of barn framing under the old methods, where long and cumbersome timbers are to be mortised and tenoned, then pinned at the joints. The truss shown is so simple that four men have erected a large barn of this type without any other help. As the roof arches go up into place one at a time, it will appear that even a carpenter is not necessary to put such a barn together, since there is nothing at all complicated about the whole structure.

The rafters, the studding, and the floor joists are all spaced 2 ft. center to center in this balloon-frame barn. There are no cross braces in the mow space so that this is left entirely open for hay storage.

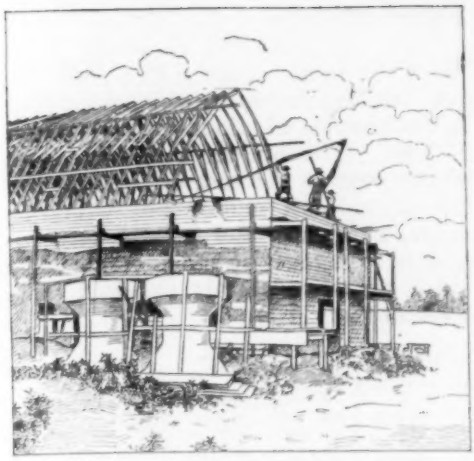
The floor and footings are of concrete and extend 2 ft. above the grade line, so as to keep all the woodwork away from the soil moisture, which causes rot and decay. The sills and plates are double 2 by 6-in. material, as are also the studs and the rafters, all being spaced 2 ft. on centers. The roof arches are built up on the ground and are braced at the hips with two 1 by 8-in. boards. When the side walls have been all raised and sided, the roof arches are pulled up with a block and tackle, one man handling one arch at a time. They are spaced directly over the wall studs. The walls are sided horizontally; the roof is covered with sheathing and shingles, or with prepared roofing, and the 2 by 12-in. floor joists are covered with ship-lap flooring. The two girders which support the floor are made from four planks. The material list is for a 14-ft. section of a standard barn. If a longer barn is required, figure on proportionate amounts, and add the materials for the two ends.

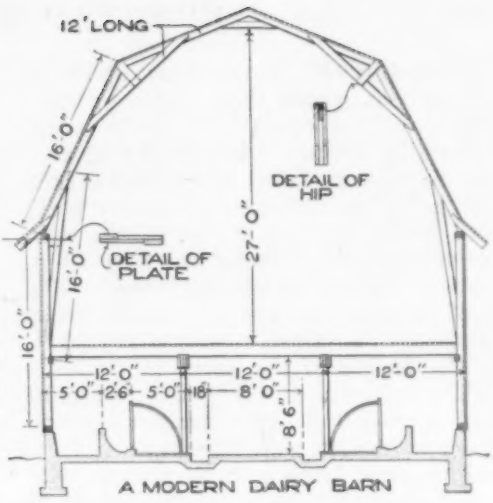
112	cu. ft. concrete foundation.
504	sq. ft. concrete floors.
56	ft. 2 by 6-in., 16-ft. sills.
56	ft. 2 by 6-in., 16-ft. plates.
28	ft. 2 by 6-in., 16-ft. rib plates.
256	ft. 2 by 6-in., 16-ft. studding.
256	ft. 2 by 6-in., 16-ft. braces.
256	ft. 2 by 6-in., 16-ft. rafters.
192	ft. 2 by 6-in., 12-ft. rafters.
48	ft. 2 by 6-in., 6-ft. collar beams.
43	ft. 2 by 4-in., 4-ft. lookouts.
256	ft. 1 by 8-in., 12-ft. hip braces.
116	ft. 1 by 8-in., 2-ft. cleats.
32	ft. 2 by 8-in., 2-ft. struts.
384	ft. 2 by 12-in., 12-ft. floor joists, sides.
224	ft. 2 by 12-in., 14-ft. floor joists, center.
224	ft. 2 by 12-in., 16-ft. for girders.
540	ft. drop siding, 6 in. wide.
650	ft. roof sheathing.
7,000	cedar shingles.
600	ft. ship-lap flooring.

Materials for the two ends of a 36-ft. barn:

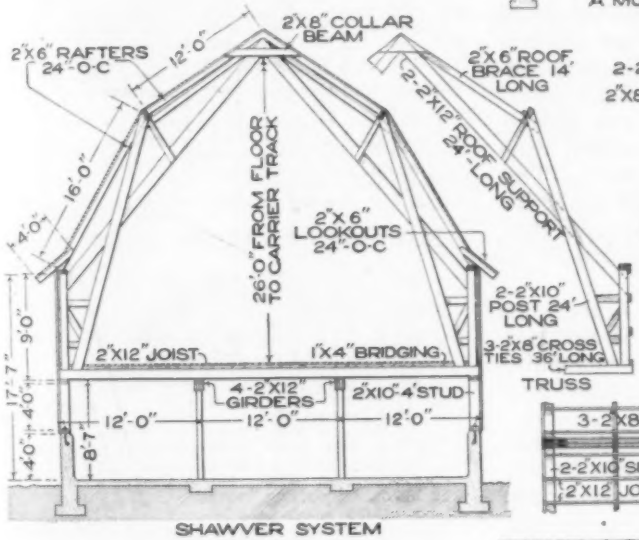
290	cu. ft. concrete foundation.
144	ft. 2 by 6-in., 16-ft. sills.
240	ft. 2 by 10-in., 16-ft. plates.
1,250	ft. 2 by 6-in., 16-ft. studing.
160	ft. 2 by 8-in., 16-ft. braces.
2,560	ft. drop-siding lumber.

The Shawver system of barn framing gives the barn builder a stiff, plank-framed barn with an unobstructed mow space that will hold an abundance of hay or rough feed. It is a plan that is particularly well-fitted for use in larger structures. The details show a barn that is 36 ft. wide, a width that is now generally accepted as being the best all-around size for two rows of stock. Wider barns may be built, however, and the same general idea of construction may be followed out if desired.

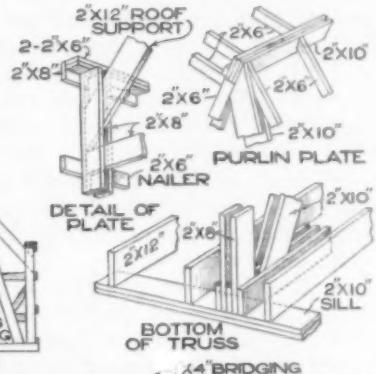




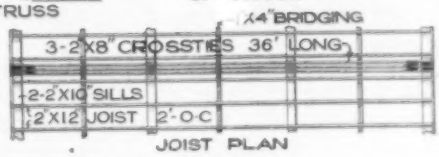
A MODERN DAIRY BARN



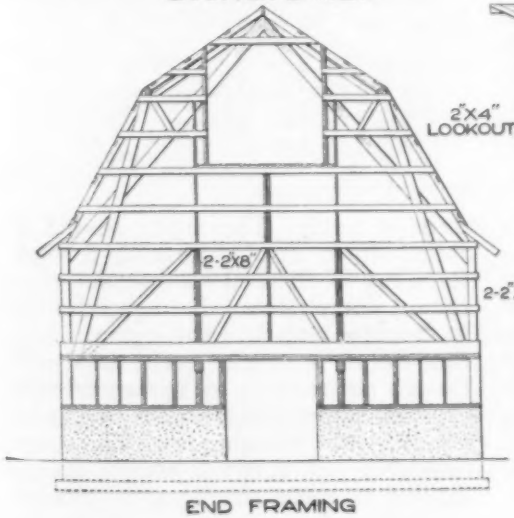
SHAWVER SYSTEM



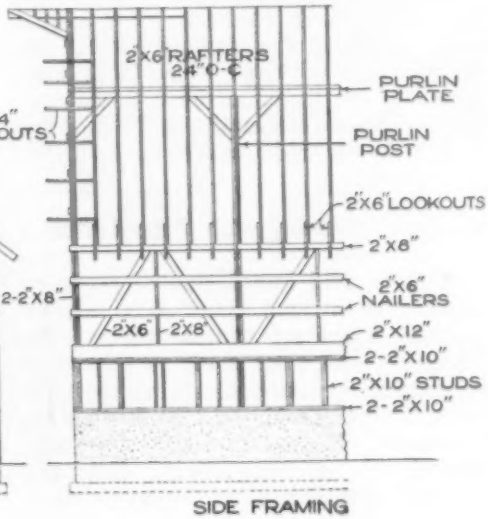
TRUSS



JOIST PLAN



END FRAMING



SIDE FRAMING

The concrete work runs up 4 ft. above the grade line. The ground-floor walls, above the concrete work, have 2 by 10-in. studs placed 2 ft. center to center. The double-thick sills are bolted to the concrete every 6 ft., and the plate at the top of the 4-ft. studding is made from two 2 by 10-in. planks, spiked firmly together. The roof trusses are shown in the cross section. These are spaced every 14 ft. in the length of the barn.

The rafters are of 2 by 6-in. material and spaced 2 ft. apart from center to center, after the roof trusses and purlin plates have been put in place. The lower rafters rest on the side-wall plates, and are supported at the hip by the heavy purlin plate, which is carried by the trusses. The floor joists are 2 by 12-in. planks and are spaced every 2 ft. from center to center, running crosswise with the barn. The continuous girders, made of 2 by 12-in. planks, spiked together, are supported by columns in the center, spaced 12 ft. apart across the barn.

If the barn has been braced as shown, and a good quality of material used together with good workmanship, it will stand the pressure of wind and snow.

As a basis for estimate, a 14-ft. section of a 36-ft. barn has been taken. To compute the amount of materials required and to obtain only a general idea of the cost for any other length barn, multiply the amounts listed by the number of times that 14 is contained in the length of barn that is desired. As an example, a 70-ft. barn that is 36 ft. wide would contain five times the material for a 14-ft. section, not counting the ends, which are added to the amount obtained for any length of barn. The builder may add about 50 per cent to the cost of the material for labor, barn equipment, windows, doors, hardware, and paint where up-to-date construction is wanted. The following materials are required for a 14-ft. section:

224 cu. ft. concrete walls.
504 sq. ft. concrete floor.
95 ft. 2 by 10-in. sills.
95 ft. 2 by 10-in. plates.
150 ft. 2 by 10-in., 4-ft. studding.
56 ft. 2 by 12-in., 14-ft. nailers.
56 ft. 2 by 6-in., 14-ft. nailers.
112 ft. 2 by 8-in., 14-ft. plates.
256 ft. 2 by 6-in., 16-ft. rafters.
192 ft. 2 by 6-in., 12-ft. rafters.
53 ft. 2 by 8-in., 10-ft. center posts.
64 ft. 2 by 6-in., 4-ft. lookouts.
85 ft. 2 by 8-in., 6-ft. collar beams.
92 ft. 2 by 10-in., 14-ft. purlin plates.
19 ft. 2 by 4-in., 14-ft. purlin plates.
144 ft. 2 by 6-in., 12-ft. braces.
400 ft. 2 by 12-in., 12-ft. joists.
224 ft. 2 by 12-in., 12-ft. girders.
470 ft. barn-siding lumber.
650 ft. roof sheathing.
7,000 cedar shingles.
600 ft. ship-lap flooring.

Materials for the two ends:

576 cu. ft. concrete wall.
120 ft. 2 by 10-in., 16-ft. sills.
120 ft. 2 by 10-in., 16-ft. plates.
400 ft. 2 by 10-in., 4-ft. studding.
288 ft. 2 by 8-in., 36-ft. crossties.
96 ft. 2 by 8-in., 9-ft. posts.
320 ft. 2 by 10-in., 24-ft. purlin posts.
224 ft. 2 by 10-in., 28-ft. roof supports.
14 ft. 2 by 10-in., 4-ft. ties.
48 ft. 2 by 8-in., 16-ft. braces.
38 ft. 2 by 6-in., 14-ft. roof braces.
386 ft. 2 by 8-in., 36-ft. nailing girts.
556 ft. 2 by 6-in., 12-ft. nailing girts.
75 ft. 2 by 4-in., 4-ft. lookouts.
2,265 ft. barn-siding lumber.

Materials necessary for one Shawver barn truss, 36 ft. wide:

144 ft. 2 by 8-in., 36-ft. crossties.
48 ft. 2 by 8-in., 9-ft. posts.
160 ft. 2 by 10-in., 24-ft. purlin posts.
112 ft. 2 by 12-in., 28-ft. roof supports.
7 ft. 2 by 10-in., 4-ft. ties.
24 ft. 2 by 8-in., 16-ft. braces.
29 ft. 2 by 6-in., 14-ft. roof braces.

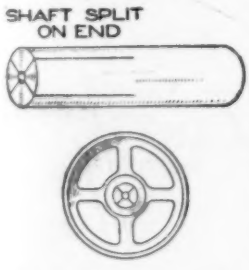
Making Driveway with Tarred Stones

With a solid foundation of stone to begin with, spread about 3 in. of fine crushed stone at the center of the driveway, and rake it off to the outer edges until it is about 1 in. deep; then make the center about 3 in. high with the stone. The depth of this stone will depend on circumstances, but the amount mentioned will give a very durable road. The stone should be rolled down firmly, forming a slight rounding of the bed so that the water cannot form pools. Saturate the bed with water and then roll again. After the water is pretty well dried out, though not entirely so, spread thin tar, or crude asphaltum, over the bed, using a coarse-rose watering can. The stones should be well covered, yet not enough applied to cause the liquid to run off.

Over this, sprinkle some fine-crushed stone, after which allow the roadway to remain unused for a few days. In about a year, another coating of asphaltum should be applied, and no further attention will need to be given it, barring accidents.—Contributed by A. A. Kelly, Frazer, Pa.

Fitting Worn Wheel Tightly on Its Shaft

A certain wheel used on a gasoline engine was brought to my shop for repairs. The wheel originally was fastened to the shaft with a key, but it had become worn so badly that the hole was too large for the shaft. The owner wanted the wheel put on the shaft to stay and run true, and offered a box of cigars as a premium over the cost of the repair if I could do it for him. I first drilled a hole in the shaft end to a depth a little more than the length of the wheel hub, then the shaft end was split with a hacksaw cut, down to the bottom of the hole two ways, as shown. A piece of sheet metal was used to bush the hole in the wheel and take up the wear. After fitting on the wheel as tightly as possible by this means, a pin slightly larger than the drilled hole was driven into it. The wheel was set tightly and in such a manner that it ran true.—Contributed by H. T. Mitchell, Toyah, Tex.

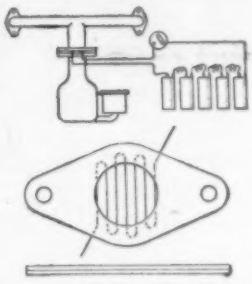


A Bronzing Liquid

A good bronzing liquid is made from gum dammar with benzol, and a small portion of raw oil to give it elasticity. Coat the object with this and dust on the bronze. When the bronze is dry, coat it with thin shellac varnish to protect it from the atmosphere. In this way the bronze will retain its brightness for a long time.

Easy Way to Start an Automobile Engine in Winter

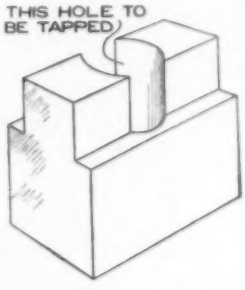
To facilitate starting an automobile motor in cold weather, the device shown in the illustration has been used. It can be made by any automobile owner. It consists of two asbestos gaskets with a coil of wire between them. This takes the place of the regular gasket between the carburetor and intake pipe. The iron wire is connected through a switch to the six-volt ignition battery. This switch is closed just before cranking the motor, and the wire gets hot enough to vaporize the gasoline as it issues from the carburetor. About 9 in. of No. 24 gauge wire will be found quite satisfactory.



Odd-Fluted Taps

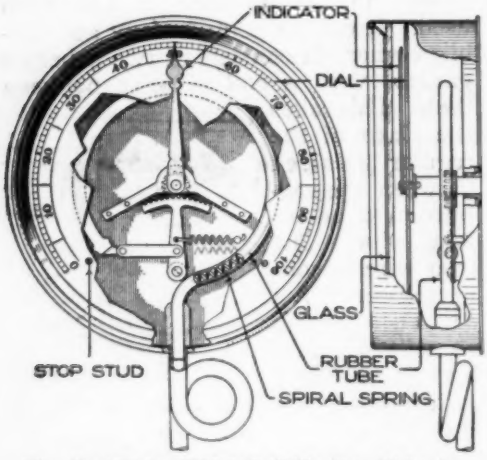
Except in the smaller sizes, 3/16 in. or under, taps for all ordinary work are made with four flutes. Where the hole being tapped does not run through solid metal, or, as is frequently the case, two openings are opposite, an even-fluted tap makes poor work and often breaks for the reason that two opposite flutes drop into the opening at the same time and then engage two sections of metal with so great a strain as to cause a break.

For such work odd-fluted taps are preferable and can be obtained at a slight advance in price. On one particularly difficult piece of work, as shown, several thousand steel pieces were tapped with a seven-fluted tap without breakage.—Contributed by Donald A. Hampson.



Homemade Pressure Gauge

In the construction of all pressure gauges a bent tube is used to operate the pointer, its movements being actu-



The Bent Tube, Which Is Difficult to Make, is Replaced by a Coil Spring and Rubber Tubing

ated by the tendency of the tube to straighten out when pressure is applied. The gauge illustrated can be easily made, as the tube is constructed of a small coil of brass or copper wire over which a rubber tube is drawn. This makes a tube sufficiently sensitive to record the low pressures used on gas and liquids in the home workshop.

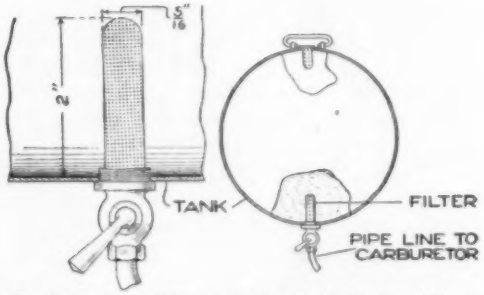
The end of the tube is closed with a cap, and to this cap the connecting link and the gearing are attached. The gear and rack and the method of connecting them are shown clearly, and anyone capable of building the gauge will require very little instruction in addition to the sketch. The small gear is ½ in. in diameter.

Studs are set in the dial to stop the pointer so that the sector and gear will not get out of mesh. The gauge is graduated to show a few pounds over the high limit. The pressure tube must be of a size to give a sectional area of 1 sq. in. The small spiral retaining spring must be of No. 16 gauge spring brass, and the pounds-per-square-inch graduations should be ⅛ in. apart, but as there will be considerable variation in the springs and connections, it is best to attach a raised vent near the gauge and leave the top open, placing upon it a soft leather pad, and on the pad, a 1-lb. weight. When the pressure raises this weight and escapes, mark the 1-lb. graduation on the dial. Then add 1 lb., making 2 lb. on the open vent, and so on.

It is not necessary to have a number of 1-lb. weights; stones, or anything, will do, just so the weights applied are known.—Contributed by J. B. Murphy, Plainfield, N. J.

Gasoline Filter for Automobile Tanks

When a gasoline filter is fitted to a car it is usually placed somewhere in the pipe line from the tank to the carburetor. A better position is at the base of the tank and projecting inside, where the gauze is constantly washed by the swaying of the gasoline caused by the motion of the car. The finest copper gauze should be used, and it is best shaped by wrapping it on a steel rod, about 5/16 in. in diameter, while soldering the seam and top. The only difficulty in fitting up this type of filter is in removing the pipe union at the base of the tank, but this trouble is more



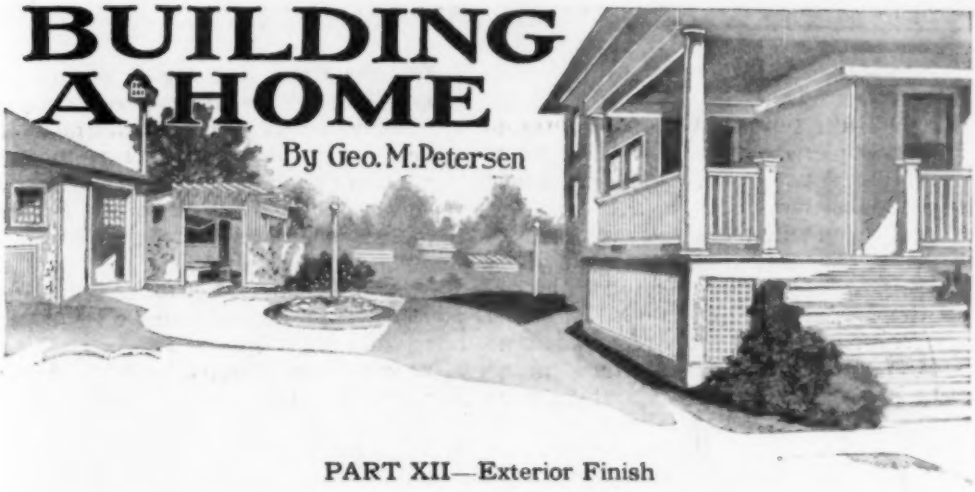
The Place for a Filter Is in the Tank Bottom, Where It will be Kept Clean

than offset by the absence of a stopped jet in the future.—Contributed by Morris G. Miller, New Rochelle, N. Y.

¶A handkerchief, or any piece of cloth, wadded into the canopy of an electric fixture when installing prevents it from catching the dirt which mars the stem when the canopy is pushed up in place.

BUILDING A HOME

By Geo. M. Petersen



PART XII—Exterior Finish

IN no branch of the building game is poor material and workmanship so common as in exterior painting. Almost every person who has handled a brush of any kind thinks he is capable of quickly becoming a first-class painter. In reality, however, such is not the case, for in this day of substitution of inferior paint ingredients, it is necessary for the painter to be familiar with all kinds of painting materials, as well as with the tricks used by the unreliable painter.

Architects' specifications for painting generally set forth that the painting contractor must provide all the materials of every description, including ladders, scaffolding, ropes, brushes, etc., for the proper performance of the work in a substantial and workmanlike manner; all the materials to be the best of their respective kinds, and all woodwork to be thoroughly cleaned before being painted; all nail holes, joints, cracks, and defects in materials to be filled with putty; all jointed work to be sanded smooth before applying the second coat. The specifications then itemize what work is to be done, and how, as follows. All outside woodwork to be given a certain number of coats of good white-lead and linseed-oil paint, mixed to correspond with the color selected by the owner on outside blinds or shutters, exterior of sash, window screens, door screens, outside doors, tin and galvanized ironwork, ironwork, roofs, and cement work.

It is the purpose of this article to enlighten the owner so that he will be able to know whether his specifications are rightly drawn and whether they are being followed by the painting contractor.

Undoubtedly the best way of knowing if the work is being rightly done, is to know how to do it. There are many men who, through a desire to save money, or because they want to do some of the work themselves, pick out the exterior painting as being the easiest thing to do. Like every other trade, however, it is not as easy as it appears. Painting means to protect with paint, and not merely to decorate the surface. All paints do not protect, and therefore many buildings which appear really beautiful upon completion, will present a bad appearance in a few weeks or months. A well-painted building will seem to improve as time goes on, and is well worth the extra expense of having it painted properly and by an experienced person. Probably the houses most attractive to the amateur painter are summer homes, cottages, or bungalows, which can be painted by the owner Saturday afternoons, holidays, or while on his vacation, necessitating no lost time from his business activities.

Exterior paint is composed of white lead, usually sold in paste form, being ground in about 10 per cent, by weight, of boiled linseed oil, zinc white, boiled linseed oil, turpentine, and japan drier.

White lead, when used alone with the oil, has a tendency to "chalk," that is, after a short time, the lead becomes a white powder on the surface and rubs off. Zinc never rubs off, but if used without other pigment, it becomes extremely hard with a tendency to peel off. Exhaustive tests have been made by the leading paint manufacturers, and also by the Department of Agriculture, to determine just what proportions of lead and zinc to use. The result of these tests has proven that if about 75 per cent of white lead and 25 per cent of zinc white are used, the paint will be very durable. This combination will not chalk off, but will set hard without danger of peeling.

A very satisfactory formula for exterior paint is as follows:

Pure white lead, ground in oil	75 lb.
Pure zinc white, ground in oil	25 lb.
Boiled linseed oil	4½ gal.
Spirits of turpentine	½ gal.
Japan drier	½ pt.
Color ground in oil	Sufficient quantity.

Care must be exercised by the amateur to prevent getting too much drier into the paint. A large quantity is sometimes used on temporary work where the paint must dry quickly and durability is not considered. Make it a point to use as little drier as possible, and never more than 10 per cent, by volume, of the amount of linseed oil. A large quantity of drier makes the paint dry very quickly, but it takes the life out of it.

Before commencing to paint the exterior of a house, be sure that the woodwork is thoroughly dry, as it is almost impossible to get a good job when the dew, or any other dampness, is in the wood, since this will swell it and prevent the lead from sticking to the grain. When the surface is dry, all knots should be coated with shellac varnish, to prevent the rosin from working through and discoloring the paint, and also to keep the paint from soaking into the soft places surrounding the knot, which will cause a flat, or dull, spot to show when the job is finished. The entire house is then given a priming coat, which is mixed in accordance with the formula already given, excepting that the turpentine is left out and the quantity of linseed oil is doubled. After the priming coat is set, all imperfections in material are filled with putty, and the second and third coats are applied. Each of these coats should be about one shade lighter than the desired color, as the paint always darkens in drying.

At present, most of the buildings which are to be finished in anything but really light colors, such as white, canary yellow, French gray, and the like, are only given two coats of paint instead of the customary three coats. When only two coats are used, the priming coat is omitted, and the first coat is thinned out a little to make it penetrate the wood. The paint should be almost the finished color. The first coat is thinned with turpentine and boiled linseed oil, instead of double the amount of oil. For example, if the first coat contains 1 gal. of oil, use 1 qt. of oil and 1 qt. of turpentine as a thinner. This change is due to the fact that the regular priming coat has little body, being only a base for the succeeding coats, whereas two-coat work requires that the priming coat have both color and body. When medium-light colors are to be applied to a dark-colored surface, such as redwood, three-coat work should always be used if a satisfactory job is desired. To obtain the best results, the paint must be thoroughly mixed, well brushed out, and at least a week given each coat to dry before the following coat is put on.

When colors are to be used, the following formulas will be useful to the inexperienced painter. The amounts are given in parts which can be determined by weight, as this is the usual method of measuring colors in dry form or those ground in oil; only mixed paints being measured by the gallon. The quantity of paint needed is calculated by first figuring out in square feet the surface to be painted and dividing this by 600, the quotient being the number of gallons of paint required. By referring to the paint formulas given, the number of pounds of lead, and other pigments, necessary to make up the paint in the desired

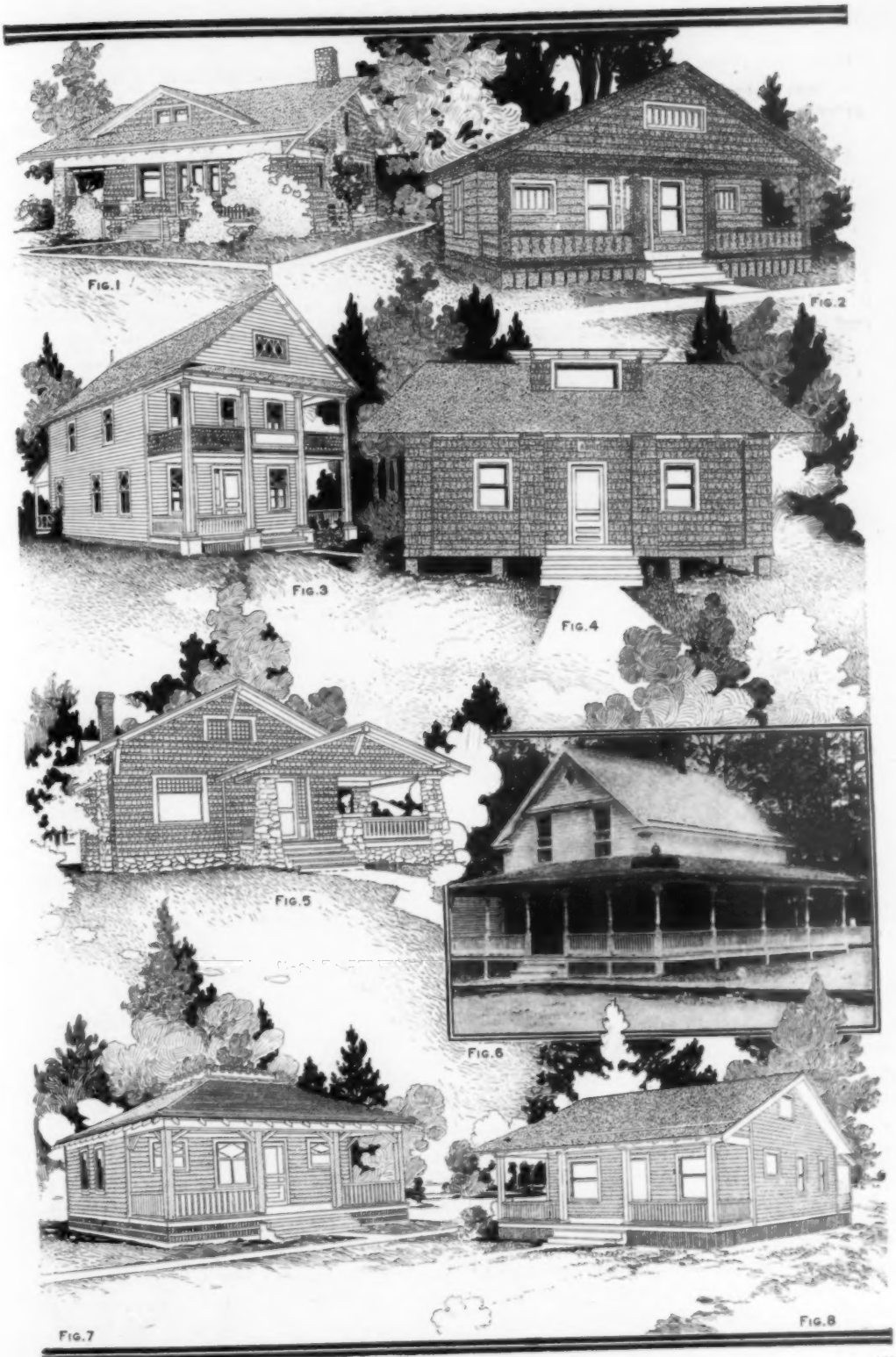


Fig. 1

Fig. 2

Fig. 3

Fig. 4

Fig. 5

Fig. 6

Fig. 7

Fig. 8

quantity is obtained. The following formulas are given in parts:

Acorn yellow: White lead, 1 part; raw sienna, 1 part.
Armenian red: Venetian red, 2 parts; yellow ocher, 1 part.
Brown: Red and black, shade to tint.
Buff: White lead, 2 parts; yellow ocher, 1 part.
Canary: White lead, 80 parts; lemon chrome yellow, 1 part.
Cream: White lead, 98 parts; French ocher, 1½ parts; lemon chrome yellow, ½ part.
Fawn: White lead, 94 parts; French ocher, 5 parts; burnt umber, 1 part.
Gray: White tinted with ultramarine blue.
Brilliant green: White and emerald green.
Ivory: White, 98 parts; raw sienna, 1 part; lemon chrome yellow, 1 part.
Lead color: White, 98 parts; lampblack, 2 parts.
Mahogany: Golden ocher, 5 parts; Venetian red, 2 parts.
Maroon: Carmine, yellow chrome, and burnt umber.
Olive drab: White, 75 parts; raw umber, 13 parts; medium chrome green, 7 parts; drop black, 5 parts.
Olive green: French ocher and lampblack.
Orange: Orange chrome yellow, or red and yellow chrome.
Pearl: White, vermilion, and Prussian blue; tone with drop black.
Pearl gray: White, 98 parts; drop black, 1½ parts; Tuscan red, ½ part.
Purple: Zinc white, 4 parts; ultramarine blue, 2 parts; carmine, 1 part.
Salmon: White, 36 parts; golden ocher, 4 parts; English vermilion, 1 part.
Deep-scarlet tint: Vermilion, 8 parts; carmine, 1 part; white, 1 part.
Silver gray: White, 97 parts; ocher, 2 parts; lampblack, 1 part.
Slate: Tone white with red, and darken with drop black.

The proper way to paint a house is to coat the trim, such as cornice, window and door frames, corner boards, water table, veranda work, and the like, first, and then lay the body color up to meet it. The sash are generally "cut in," or painted black, and should be first fitted to the frames and then removed and painted. The majority of stock sash comes with an oiled finish that greatly protects the sash from dampness, and causes it to require only one coat of paint. The meeting rails of the windows should never be painted, but may be oiled, or stained, to add to their appearance, and protect them from the weather. Paint should always be applied with the grain of the wood where possible, and well brushed out and allowed to dry thoroughly before applying the next coat.

All tinwork, such as roofs, gutters, conductor pipes, and flashing, should receive one or two coats of good red lead before being put in place, and two coats of regular lead and oil paint when the house is painted. Iron and steel, although often more perishable than wood, are often left without paint, either through a desire for a natural finish or from neglect, usually the latter. Tinwork is best left exposed to a couple of rainstorms, to wash the grease from the surface, before applying any paint, but iron and steel should be given at least one coat before leaving the shop. The best-known paint for metal work is red lead, which is especially valuable when used as a first coat and covered with a regular lead, mixed about 30 to 35 lb. of dry red lead to the gallon of oil. It should be mixed fresh every day. This paint sticks to the surface and dries like a cement.

As a good painting job cannot be obtained with poor materials, it will pay the owner to investigate carefully any prepared, or ready-mixed, paints before buying them or allowing them to be bought for his building, as comparatively few of them are fit to use. The manufacturers of these prepared products claim that, because the pigments are broken up and ground and mixed by machinery, they are more thoroughly mixed than are paints broken up and mixed by hand with a wood paddle. This statement is true as far as it goes, but it is readily understood that, no matter how thoroughly paint is mixed, it will never be paint unless the ingredients are right and mixed in the proper quantities.

A good lead and oil paint weighs about 21 lb. to the gallon, and in order to bring the paint up to the standard weight, many of the manufacturers use some inert material which is absolutely useless so far as making paint is concerned. The writer has had experience with almost every well-known brand of ready-mixed paint, and is now having the paint mixed by hand on the job, not for the reason that there is no pure ready-mixed paint on the market, but because the brands that are really good are too high in price, while the low-priced goods are unfit for use. The cost of ready-mixed paints ranges from 85 cents per gallon up, while the cost of mixing one's own paint, including labor, is about $1.75 per gallon, and then the painter knows what he has and how it will wear. A favorite trick

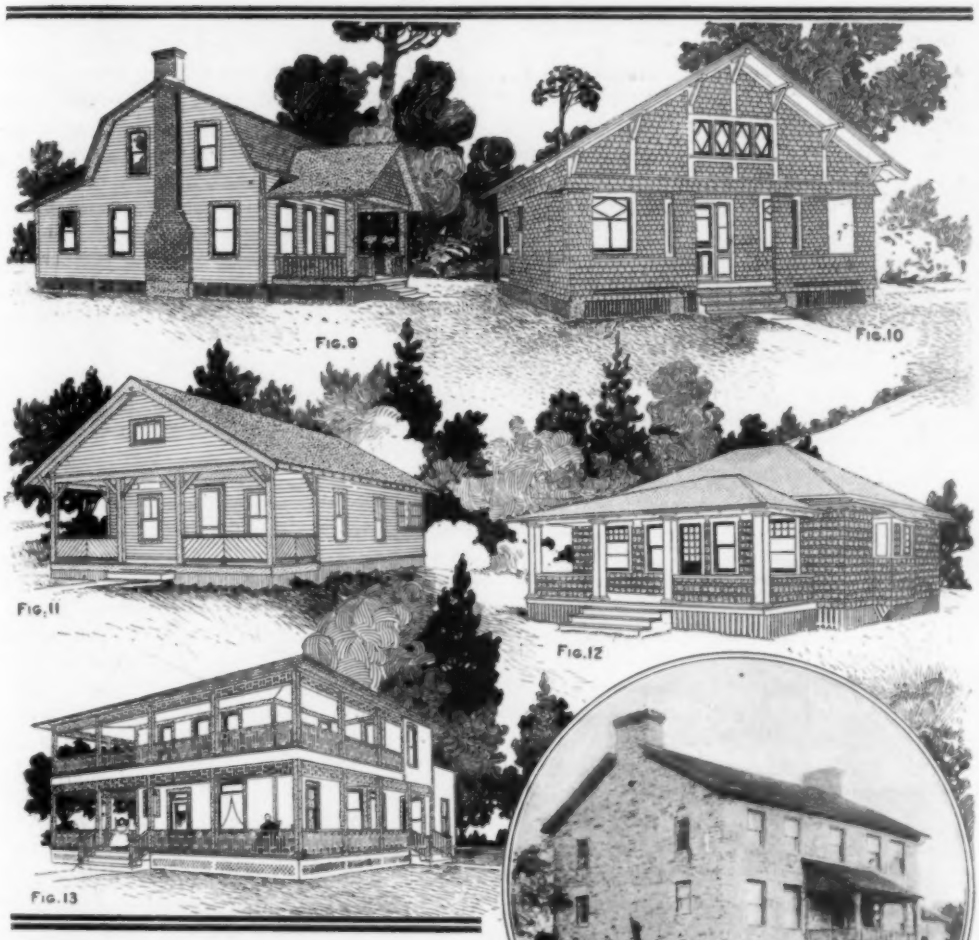


FIG. 9

FIG. 10

FIG. 11

FIG. 12

FIG. 13

FIG. 14

of the ready-mixed paint salesman is to remove the cover from a paint can, stir up the contents, and place a piece of plate glass in the center of the can. The glass practically stands alone, and one is easily convinced that, because the paint has such a heavy body, it can be greatly diluted so that one actually gets two gallons for one, or at the cost of an extra gallon of oil, but in trying to use the paint it will be found that it is too heavy, just as the salesman said; and even if diluted with oil, when laid on, it is still heavy and will not cover properly. A chemist, having made a test for me, said that the only pure material put in was the oil, and that the body material was no good for a paint.

A great many prefer stains for the exterior of their homes and these can be readily obtained at small expense. Creosote oil gives a very beautiful dark-brown shade to siding or shingles, as do burnt umber and linseed oil. Creosote oil, 1 part, and crude oil, 1 part, make a rich, light-brown stain. This creosote and crude-oil combination will also take color, so that the preserving quality of the creosote can be obtained with the artistic effect of the color desired.

Probably the best method of explaining the various color schemes is by illustrations of cottages actually built. The one shown in Fig. 1 has a shingled exterior, with field-stone columns, stone chimney, and stone foundation wall. This house would not have looked half so well, or pleased the owner so much, with any other color scheme than that used. The shingles are stained light stone-gray, and the trim is white. The roof shingles are stained green, to add to the appearance and to protect them from dampness.

A very small and cheap house, having a pleasing exterior, is shown in Fig. 2. It has a shingled gable, wide siding, and novelty rail. The body is stained a medium-dark brown, while the trim is about two shades darker. There is no need of a cottage being unattractive because it is cheap.

In Fig. 3 is shown a direct color contrast which, while a little startling in the illustration, really looks very good. Notice how much better the large octagon columns appear than those shown in Fig. 6. The color scheme of the house is white body and trim, excepting the upper veranda rail, which is dark brown.

The cheapest exterior-painting job in the experience of the writer is that on the house shown in Fig. 4. The trim is white, while the shingles were left natural, exposed to the weather for a weathered effect. If these shingles had been touched with a little creosote, or crude oil, they would have weathered without checking and curling, but a contractor must do as he is told, even though he knows it is not right.

A very neat bungalow with white trim and dark-brown shingles, which give a pleasing contrast to the stone wall and stone columns, is shown in Fig. 5. While, at first glance, there may appear a strong resemblance between the exterior of this house and the one shown in Fig. 1, which is stone-gray, a careful comparison will show that the latter would appear very much the worse if painted as the former, while Fig. 5 might be benefited by the color scheme of Fig. 1.

The house shown in Fig. 6 is used merely to show the effect of a solid-color house, and also the error, so often made, of darkening the entire first floor of a house in order to get a large amount of covered veranda which is little used. This house is all white, with the exception of the veranda floor and lattice work.

A small cottage cannot be loaded up with a lot of ornaments without making it appear "fussy." Such a one is shown in Fig. 7. Another thing that makes the house appear peculiar is the veranda railing. It will be noticed that the balusters in this rail are painted with the trim color instead of the body color.

A very pleasing little cottage, having a dark-green body and white trim, is shown in Fig. 8. This house has the popular side gable with the exposed rafter ends to the front and rear.

The house shown in Fig. 9 is painted in two shades of gray. Although the outside chimney sets off the house to a certain extent, the shape of the roof greatly detracts from its side elevation without interfering with the front.

A sort of half-timbered effect in the gable, with brackets supporting the wide overhang, is shown in Fig. 10. This house has a green-shingled body with white trim and brackets.

A neat cottage with a tight board railing and tight skirting is illustrated in Fig. 11. Diamonds may be cut in the skirting for ventilation. This house is white, trimmed with green.

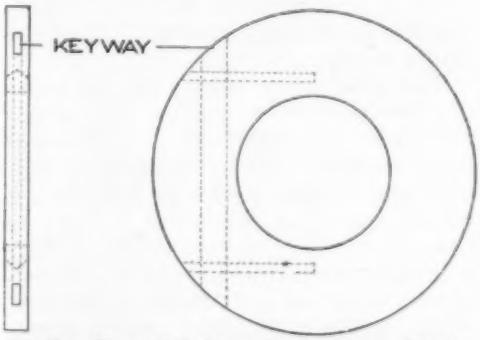
A very attractive little bungalow is shown in Fig. 12. The shingles are a light tan, and the trim white. Notice the white-slat skirting, the heavy square columns, the exposed rafter ends, and the doubled-coursed shingles.

An example of what results when the owner has his own way is illustrated in Fig. 13. This house would have been much more attractive and quite a bit cheaper if the intricate rails had been omitted. Trust the architect or contractor, and prevent duplicating the house shown. This house has a light-gray body and dark-gray trim.

An old house, built 100 years ago, is shown in Fig. 14. This house is still in the hands of descendants of the man who built it. It is said that only two gallons of paint have ever been used on its exterior. About the only thing paintable is the window and door frames, but even at that, once in 25 years is hardly sufficient to keep the woodwork in good shape. Keep a house well painted, and there will be little use for the carpenter or the lumberman.

A Locomotive Slip Hub Liner

Locomotives have hub liners cast on the driving boxes of brass to overcome lateral, or end, play between the hub of the driving wheel and the driving box. After engines have been in service, the hub liner wears off and allows excess lateral movement, which is dangerous to the operation of the engine. It is quite an expensive operation to place the engine over drop pits and lower the wheels to put new liners on the boxes, so a slip hub liner was devised which is a very simple affair, as shown in the sketch. The liner is cast of brass in two pieces, and a slot is cored for admission of a key, to hold the two parts of the liner together. These can be made of any desired diameter and thickness, and after being machined, they can be applied in a few minutes. These liners are used on

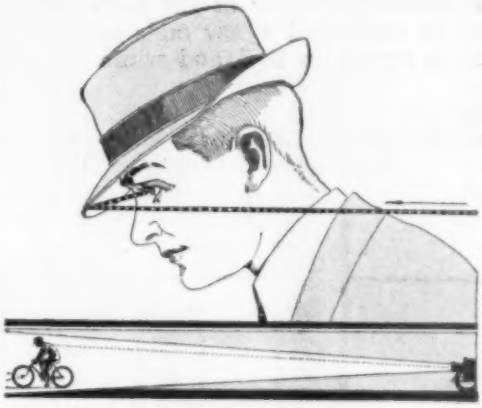


A Two-Piece Hub Liner for Insertion without Removing Locomotive Wheels from Their Frame

trailer, driving, and engine-truck wheels.—Contributed by J. R. Minter, Washington, Ind.

Hat Rim Reflects Lights of Approaching Automobiles in Rear

While out riding my motorcycle one night on a little-frequented road, I thought I was alone until I looked



The Lights from the Approaching Automobile will be Seen without Turning the Head

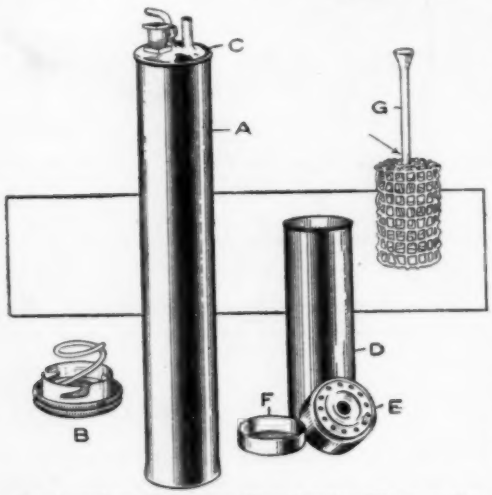
down at my watch and the reflection of the lights from an automobile in the rear showed on my hat rim. I have tried this out a number of times with good results. Tip the head forward and to one side and the lights of approaching automobiles in the rear will be reflected on the visor or hat rim.—Contributed by H. W. Potter, Oakland, California.

A Burlap Pulley

Sometimes it is desired to use a pulley which is only slightly greater in diameter than the shaft on which it is to be mounted. In this case the usual method is to forge a steel sleeve which must be bored, turned, and fastened to the shaft with a setscrew. A far simpler and equally efficient way is to paint the shaft with good leather cement and then wrap it with a strip of burlap until the desired diameter is reached, gluing the surface of the burlap as it is rolled on so that each lap is cemented to the preceding one. Care must be taken to wrap the burlap in the direction of rotation on a driven shaft, and in the opposite direction on a driving shaft.

Acetylene Generator for a Bicycle Lamp

Having need of an acetylene generator for a bicycle lamp and not wishing to purchase one, I made a very effective generator at the actual cost of 30 cents and a few odds and ends from my scrap box, and while simple



An Acetylene Generator That Applies Water to the Lower Part of the Carbide

in construction it has proved to be more economical in the consumption of carbide than most of the factory-made articles.

As shown in the illustration, the generator A consists of a piece of seamless brass tubing, $1\frac{15}{16}$ in. in diameter and $11\frac{1}{2}$ in. long, with walls about $\frac{1}{32}$ in. in thickness, which cost 30 cents. The bottom cap B was taken from an old bicycle lamp, while the top cap C, which just fits the tube, once kept the dirt out of the works of a dollar watch. The stuffing box and valve stem were parts of the burner of a kerosene heater lamp, while the filler cap and nipple came from a small oil lamp.

The carbide magazine and gas retort D was made from sheet brass, $1\frac{3}{4}$ in. in diameter and $5\frac{1}{2}$ in. long. The top cap E of the retort was taken from an old worn-out wall snap switch, with several $\frac{1}{8}$-in. holes punched in it to permit the free flow of gas, and an old tin pill box, F, did duty as the bottom cap of the retort and as holder for the slaked carbide.

The secret of the economy of this generator lies in the method of feeding the water to the bottom of the carbide instead of letting it drip on the top. The water drips from the needle valve into the funnel tube, shown at G, and passes down the tube to the point indicated by the arrow where several slits, $\frac{1}{4}$ in. long, permit it to reach the bottom layers of the carbide only. Also there is a small hole, about the size of a needle, in the bottom of the tube which lets a small portion of the water drip into the pan below. As the carbide slakes, it sifts through the grate into the space formed by the screen cage, where it is separated from the fresh carbide by an air space. Therefore, when the water is stopped, the slaked particles jolt through the grate and leave the solid unused particles in the magazine dry, while the lamp goes out almost as soon as the water is stopped. The water dropping into the pan from the small hole in the end of the tube, slakes all the particles that may pass through unslaked.

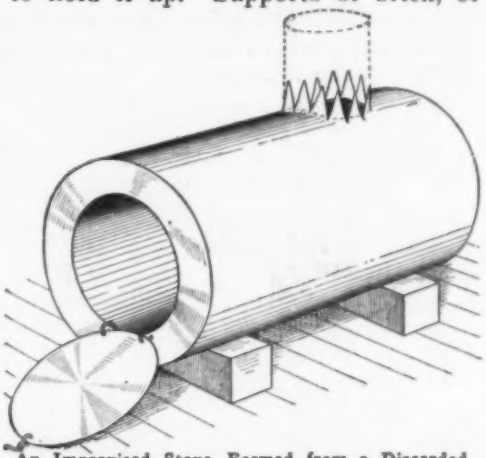
A $\frac{1}{8}$-in. copper tube, 3 in. long, with a small funnel soldered to the upper end forms the feed tube, while the grate and its supporting cage are made of ordinary $\frac{1}{4}$-in. galvanized screen, although the grate has extra wires woven in to reduce the mesh to $\frac{1}{8}$ in. The size of the cage and grate is $2\frac{1}{4}$ in. long by $1\frac{1}{2}$ in. in diameter, which permits it to slip into the shell of the retort easily.

The illustration shows all the parts of the generator except the water chamber and control valve. The water chamber is formed by soldering a disk of brass, ground perfectly round on a grindstone, 6 in. from the bottom of the large tube, the disk having a hole drilled in the center to take the adjusting valve of an old Welsbach burner, which made a splendid needle valve. The disk also has a hole drilled in it to take a $\frac{1}{8}$-in. copper tube, which passes through the water chamber and through the top cap to form the gas supply pipe.

The only difficult part in the construction of this generator is the soldering of the disk in the tube, and this was accomplished in the following manner: First, the needle valve and the gas pipe were soldered in the disk. The inside of the tube and the disk were cleaned with emery and soldering flux was applied; then both were tinned where the solder was to run. Next, the valve stem was soldered to the movable part of the valve and screwed home; and the stuffing box was then soldered to the cap and the valve stem run through the stuffing box. The cap was not fastened permanently, however; only enough to center the valve stem, the stem holding the disk so that the valve would turn true. The gas pipe running through the top cap tended to hold the disk in place while running the solder. By means of the stem the disk was raised and lowered in the tube until it was at the exact point where it was to be permanently fastened. Then a ring of wire solder was placed on, with the bottom of the tube up, and a gasoline torch used on the outside to heat the solder until it flowed into place. Care must be taken to prevent the disk from getting too hot and loosening the solder out from the valve and gas pipe fastenings. After testing for leaks, the top cap was soldered in place, and the generator was complete.—Contributed by T. T. Sturgeon, Los Angeles, Cal.

Empty Carbide Can Used for a Heating Stove

In Mexico most of the fireplaces produce more smoke than heat, but while the natives do not mind that, we did, and proceeded to make a heating stove from a carbide can, which gave very satisfactory results. We have made quite a number of them as shown in the illustration. A circle was drawn at the place where the stovepipe was to be attached, and the metal cut inside of the circle like cutting the pieces of a pie, and these were bent out so that the joint of pipe could be set over them. The cover was hinged to the front with bent wire, and a hook made to hold it up. Supports of brick, or

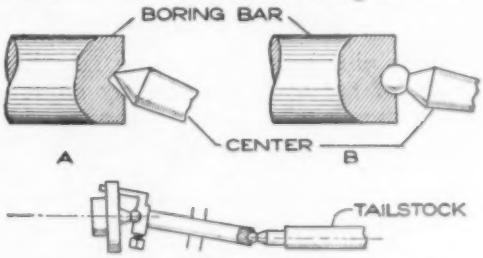


An Improvised Stove, Formed from a Discarded Carbide Can, Used Instead of a Smoking Fireplace

stone, were used to raise the stove from the floor.—Contributed by W. A. Lane, El Paso, Tex.

Centers for Taper Work on a Lathe

To turn a taper between centers on a lathe necessitates the shifting of the tailstock, and to do this with the ordinary lathe centers, as shown at A, is not the best method, as the centers wear on the point and will not run true. A good way is to have a center with a ball point, as shown at B. This center will keep the work true and it can be run at high speed for the softer metals. The method of using the bor-



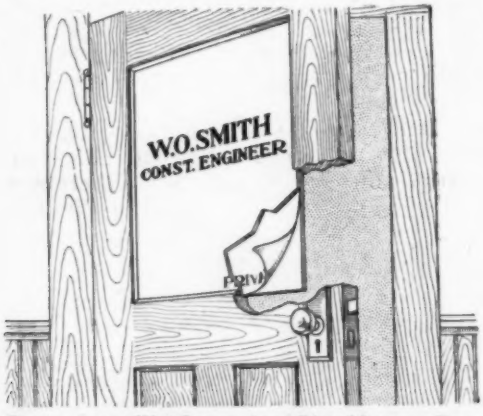
Ball Centers for Use on a Boring Bar in a Lathe to Prevent Wear

ing bar is clearly shown at C.—Contributed by Arthur L. Kerbaugh, Allentown, Pa.

¶Use sharp cutters for finishing a milling-machine job.

A Translucent Door

A good substitute for a frosted-glass door, or window, may be made as shown in the illustration. Two panes



Tracing Linen Well Lettered and Placed between Two Panes of Glass Makes a Translucent Window

of ordinary window glass are used, and a piece of tracing linen, or oiled paper, the same size, is inserted between them. Any lettering necessary for the door can be placed on the linen or paper. The rear glass may be omitted if desired and the cloth stretched as tightly as possible to a single pane of glass, but the former method makes the more permanent job.—Contributed by Walker O. Nettleton, Washington, D. C.

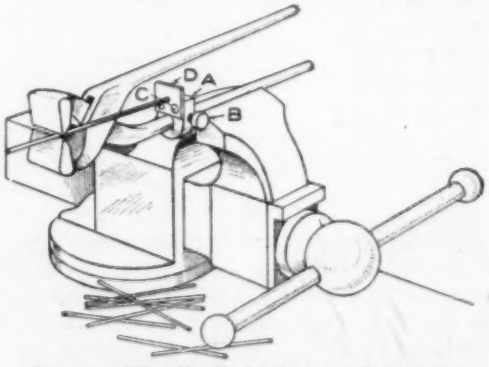
Flexible-Pipe Conveyor for a Tool-Grinding Machine

This pipe was designed to take the place of the stiff, but slightly adjustable, metal tube used to convey the dust from a tool-grinding machine to the main blowpipe. In making the pipe, a broom handle was used for the arbor, and on this was wrapped soft-iron wire while it turned in a lathe, as in winding a spring. Over this spring was wrapped light canvas and an outside wrapping of strong twine.

At each end, the first two or three turns of wire were fastened with light copper wire, while the twine wrappings were merely tied together. To attach the sections, a piece of light canvas, large enough to lap over the ends of the tubes, was wrapped around the tubing twice and bound tightly with soft-iron wire. The inside wire lining, the twine wrapping, and the wire of the coupling, all mesh together and form a thoroughly tight joint. Such a tube will give first-class service, but is for inside work only, as it is not made to stand exposure to the weather.

Cutting Brass-Wire Pins to Length

A laborer was set to work in a shop cutting pins from No. 16 gauge brass wire, each to be 5¼ in. long. Having no special tool for this work he made one as shown. A square piece of metal, A, was drilled to fit the plier handle, then drilled and tapped on one side for a setscrew, B. Two holes were tapped for the screws C and the two upper corners rounded off. A piece of sheet metal D was drilled and shaped as shown and then fastened with the screws to A. The stop was set on the lower handle to the required distance from the cutting edge, and a vise held the lower handle. By feeding the wire against the stop, cutting it off, and letting the pieces drop into a box, the



Stop on a Plier Handle for Gauging Pins as They were Cut from the Wire

work was accomplished quickly.—Contributed by Mark Gluckman, Jersey City, N. J.

¶Do not be stingy with varnish, for the more coats applied the better will be the gloss and finish.

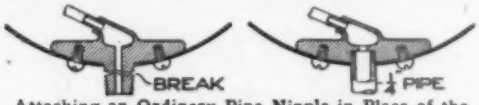
Filling Leaks and Blowholes

Where it is necessary to fill a small crack, or leak, in a difficult place, or if soldering cannot be used as a means of closing the opening, an amalgam composed as follows may be used with good results. Melt together 30 parts of zinc and 20 parts of tin, then granulate the mass. A good method is to use filings from the metal combination; however, the granulation can be done by pouring the melted metal through a strong stream of water issuing from the nozzle of a hose. These are well kneaded with mercury until the amalgam, like a dough, is formed. The excess mercury is squeezed out, and the plastic mass forced into the hole and given time to harden. When hard, it can be filed the same as the metal about it. Because of the hardening action, only enough of the amalgam should be mixed for the work at hand.

Repairing a Steam-Gauge Pressure Connection

The nipple by which the steam-gauge pressure pipe connects to the gauge is frequently broken. The mishap occurs commonly as a result of an accidental fall, and sometimes through the too vigorous application of a wrench in drawing up the brazing collar, or nut, of the pipe. After such an accident it is often the practice to order a new tube casting, as the nipple in most standard gauges is a part of the casting. If the lengthwise cross section of the casting were examined, the practical method of repairing such a break would in the majority of cases be readily apparent. There is plenty of stock in the casting for drilling it out deep enough to take a ¼-in. pipe tap, after which a common ¼-in. gas-pipe nipple can be screwed in tightly. This will afford, in almost every case, a connection for the gauge which can be easily made.

I was in a contract shop where a great number of gauges were sent in for repair, and the breakage on 60 per cent of them was of the above-mentioned kind. The method described and illustrated was put into practice and resulted in a much cheaper job that was just as satisfactory, as well



Attaching an Ordinary Pipe Nipple in Place of the Steam Connection on a Gauge

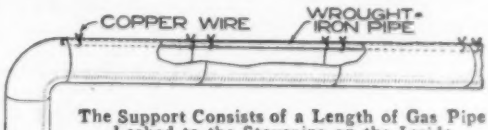
as in a quick return of the gauge to the firm, which usually had no other gauge on hand and was therefore eagerly waiting for it.—Contributed by F. W. Bentley, Jr., Missouri Valley, Iowa.

To Detect Water in Paint

The presence of water in white-lead paint, paste or mixed paint, may be discovered by adding a little eosin dye and rubbing it up on a porcelain slab. The water, if present, will cause the dye to stain the paint. The maximum amount of water in pure white lead should be two per cent, and any amount in excess of this may be regarded as adulteration.

Concealed Support for a Stovepipe

The illustration shows a successful way of keeping a long horizontal length of stovepipe from sagging in an unsightly manner. A piece of old water or gas pipe is inserted as shown and lashed to the stovepipe with loops of copper wire passed through small holes punched in it. The method of assembling is to slip the stovepipe sec-



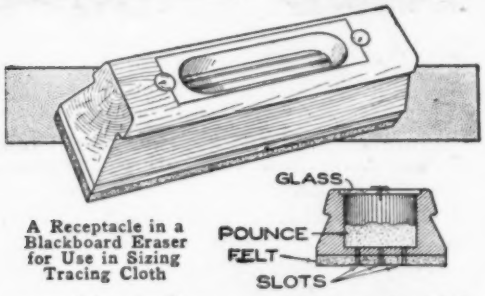
The Support Consists of a Length of Gas Pipe Lashed to the Stovepipe on the Inside

tions over the wrought-iron pipe one at a time and lash each section as it is added. It is advisable to use copper wire, as it will not corrode.

¶Paper or wood used to hold putty will absorb the oil and cause it to harden quickly.

Pounce-Dusting Pad for Tracing Cloth

Tracing cloth used by draftsmen often has a glossy surface which will not take ink readily. The gloss is removed by various means, one of which is to dust the surface with pounce, powdered chalk, or talcum powder, rubbing it over the surface of the cloth with chamois, cloth, or a piece of blotter, then brushing off the excess. One of the handiest ways is to sift a quantity of the pounce on the cloth from a can with a perforated top and then spread it with an ordinary blackboard eraser.

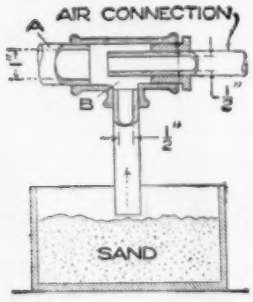


A Receptacle in a Blackboard Eraser for Use in Sizing Tracing Cloth

The sketch shows an improvement on this method. A powder magazine is formed in the body of the eraser. Tapping the eraser on the cloth causes a small amount of the powder to sift out, and then it is spread and worked in with the eraser.—Contributed by Donald P. Maxwell, McKeesport, Pa.

Homemade Sandblast

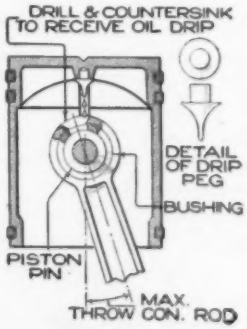
Where compressed air is available, a very convenient sandblast arrangement can be made of pipe and fittings. The main body consists of a 1-in. tee, into which is turned a 1-in. pipe, A. The other two openings of the tee are reduced to ½ in., and ½-in. pipe connections made to them. A long thread is cut on the end of the air connection so that it can be turned in far enough for the end to pass the sand connection B. The intensity of the blast may be regulated by turning the pipe A in far enough partly to cut off the sand supply.—Contributed by E. K. Marshall, Oak Park, Ill.



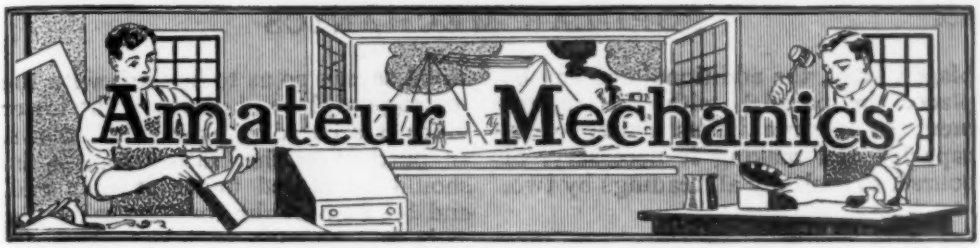
Piston-Pin Lubrication

In the case of vertical-cylinder automobile motors where the piston pin is fastened to the piston, the usual construction of a hole in the top of the connecting rod is not always suitable to insure a good supply of oil to the pin. This is because the oil supply is in the form of a fine spray, or mist, churned up from the splash pockets, and the hole in the top of the connecting rod is usually too small to admit enough of the spray for good lubrication.

The illustration shows a remedy for this condition, which can be applied to existing motors of the type mentioned without changing the design or adding too much weight to the piston. The remedy is to place a taper pin in the center of the under side on the piston head. This pin will collect the drops of oil which form from the spray and allow them to drop off the end into a hole in the top of the connecting rod.



The pin, or "drip peg," should be made of steel and well finished. It may be driven, or screwed, into the center of the piston head. Plenty of stock will be found at this point, as the makers have allowed material for the center hole. The top of the connecting rod should be drilled about ⅜ in. and countersunk generously. This will not lower the effective strength of the rod, as its bearing is on the lower side. —Contributed by W. Burr Bennett, Bridgeport, Conn.



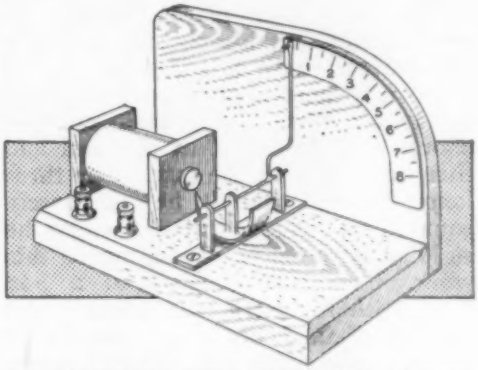
A Homemade Ammeter

By JOHN D. ADAMS

WHERE a high degree of accuracy is neither desired nor necessary, a very satisfactory ammeter may be made at the cost of a few cents, and without using hairsprings, permanent magnets, or other articles usually not at hand.

The actuating device consists of a small coil of coarse, insulated wire, with a bundle of soft-iron wires for a core, which attracts a curved, soft-iron, wedge-shaped armature. The moving system is so balanced that the armature will hang as illustrated when no current is passing. On account of its shape, the higher the armature rises, the more iron it presents to the influence of the magnet, and, on the other hand, the greater will be the effect of gravity. The advantage of this type of control is the elimination of the irregular readings of the scale, due to the law of inverse squares, that usually follow when any method depending upon a variable distance is used. Further, the readings can be had as desired by altering the taper of the armature, its thickness, or its distance from the magnet, and also by adding a small weight of nonmagnetic material at the bottom. As most commercial circuits supply alternating current, the friction of the bearings does not affect the readings, since the alternations set up a decided vibration in the entire moving system, thus eliminating static friction.

In view of the variations above referred to, it will be evident that it is not very essential of what dimensions the apparatus is made. The instrument that I use has a base measuring 2½ in. by 5 in. The coil is built on a tube of glued paper, and contains about 15 ft. of No. 16 gauge wire. The terminals consist of the brass bolts taken from discarded dry cells. A steel sewing needle serves as a shaft, and a piece of wire for the pointer. The



A Very Satisfactory Ammeter for Use Where Accuracy is Not Desired or Necessary

various joints are made with soft solder, and suitable stops are provided to keep the armature from shifting laterally. In calibrating, a blank scale should be glued in position and as many 55-watt lamps as possible arranged so that they can be placed in the circuit, one at a time. On a 110-volt line, each lamp added will mark a half-ampere point. If a sufficient number of lamps to carry the scale high enough cannot be secured temporarily, a resistance of some 20 or 30 ohms should be placed in the circuit without any lamps. Note the reading in amperes on the scale thus far constructed, and then begin adding the lamps again, making a mark on the scale as each lamp is added. In this manner a scale may be built up sufficiently accurate for all practical purposes.

If two identical coils are made in

place of one, the additional coil can be placed in parallel with the instrument as a shunt, thus doubling its capacity and making it necessary, of course, to multiply all readings by two.

Footstool

The material necessary for the footstool shown in the illustration is as follows:

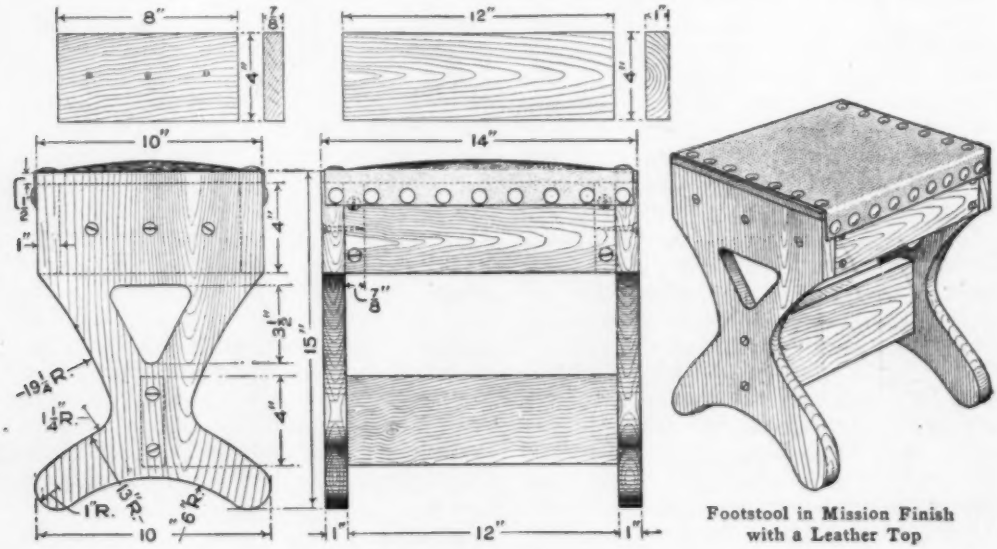
2 end pieces, 1 by 10 by 15 in.
3 cross braces, 1 by 4 by 12 in.
2 end braces, ⅞ by 4 by 8 in.
1 top board, ½ by 10 by 14 in.
1 piece of leather, 11 by 16 in.
Round-head wood screws and nails.

The two end pieces should be marked to a suitable pattern, and may be cut out with a scroll or coping saw, or, if these are not available, with a keyhole saw. The center opening should first be bored at one end and then cut out with the saw. The three long braces should be accurately squared and finished at the ends; the rigidity of the stool depending on this work. The seat consists of a box form with the open side down. The top is a ½-in. board, 8 in. wide by 12 in. long; the sides are formed by two of the long braces, and the ends are the short braces. This box is securely put together with nails, and then screwed in position with round-head wood screws so as to be flush with the top edge of the end pieces. The lower brace is secured in place with screws. In putting on the leather top, ½ in. should be turned under at each end, and 1½ in. brought down on each side. This will provide sufficient looseness to pad the seat properly. Large round-headed brass nails can be used, producing a neat appearance. The stool is then ready for a suitable stain or finish.—Contributed by Stanley B. Furbeck.

Stopper for a Bunghole

While we were filling our barrels at the cider mill it was discovered that one barrel had no stopper. This did not bother the cider-mill man, who took up a sound apple of about the dimensions or diameter of the bunghole and squeezed it in, tight as a cork, then shaved it off flush with the barrel staves. We started home and rolled it around a great deal with the other barrels, yet it held as tightly as any wood stopper.—Contributed by A. A. Kelly, Frazer, Pa.

¶An open umbrella placed on the floor upside down makes an excellent receptacle for catching dirt and plastering when installing electric fixtures.

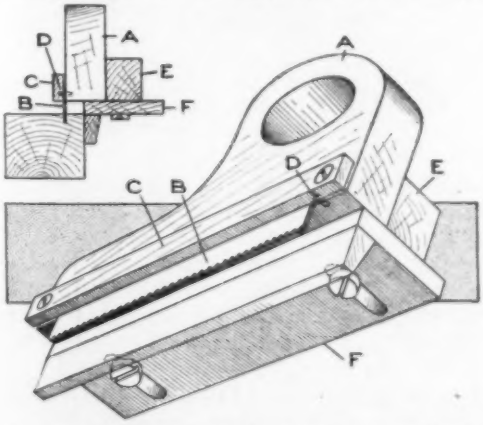


Footstool in Mission Finish with a Leather Top

Groove Cutter for Wood

Having occasion to cut some grooves in a board and not being properly equipped for such work, I made the tool shown in the sketch. Although rather crude in appearance it will do good work if properly made. It consists of a handle, A, shaped to afford a comfortable grip for the hand, and a cutter, B, made of a short piece of hacksaw blade, clamped along the left side of the handle by the strip C, which is held with screws. A pin, D, driven into the handle and allowed to project about 1/16 in., prevents the blade from sliding back under the clamp. For guiding the blade, the arrangement F is employed. An extension, E, is nailed on the right side of the handle, and holes made near each end for two screws having round heads, such as may be obtained from discarded dry batteries. These screws are for securing the sliding stop F, which is a flat piece of hardwood with slots cut near the end for screws to pass through to provide for adjustment.

In use, the guide F is adjusted until it is the desired distance from the cutter and then secured by the screws. The tool is handled like a plane, care being taken not to bear down too hard,



Two Slots are Made with the Cutter, and the Stock between Them Removed with a Chisel

as the cutter may bind and cause it to be pulled from the clamp. In cutting a groove, two slots are cut and the stock between them removed with a chisel.

A One-Runner Sled

Just an ordinary barrel stave, with a center post and a crossboard for a seat, makes a good one-runner sled.

The Barrel Stave Has a Sufficient Curve to Make It Pass Smoothly over Hard Snow

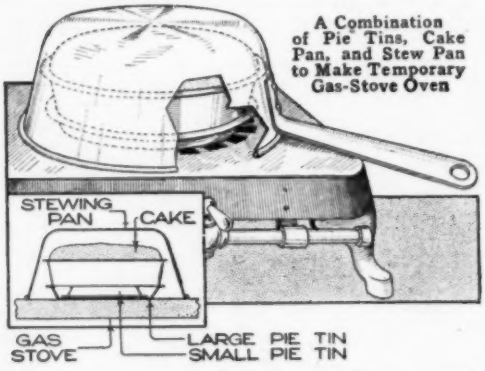
Select a good, smooth stave for the runner and securely fasten the upright, which is 1 ft. long, to it in the center. The seat is made of a board, about 1½ ft. long, nailed to the upper end of the upright.

Substitute for a Gas-Stove Oven

Wishing to bake a nice loaf cake one afternoon for dinner, and finding that the fire in my range had gone out, I remembered an oven shown me at one time for use on a small gas plate, which consisted of a cover, a bottom piece, and a support for the pan. The thought came to me that with all my pots and pans I ought to be able to get some results by the combination of two pie tins, a cake pan, and a stew pan, and on trial it baked as fine a cake as anyone could wish.

A small pie tin was placed in a larger one, as shown; on this was placed the cake pan filled with the cake batter,

and over the whole was placed the stew pan, which acted as a heat retainer or oven. A good hot flame was used at

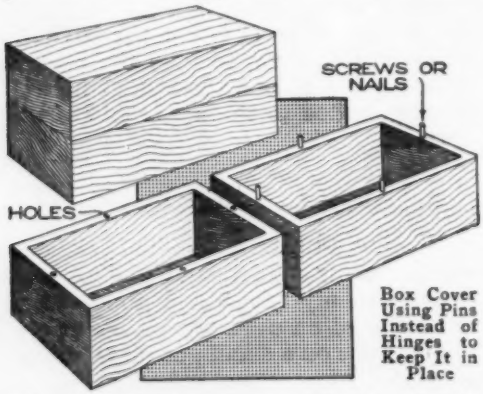


A Combination of Pie Tins, Cake Pan, and Stew Pan to Make Temporary Gas-Stove Oven

first, and was then gradually turned lower until the cake was finished.—Contributed by Mrs. Anna M. B. Romig, Allentown, Pa.

Box Cover without Hinges

Two ordinary boxes may be fitted together as one without using hinges, if nails or screws are inserted at points along the edges so that they will slip into holes bored at corresponding points in the edges of the other box.



Box Cover Using Pins Instead of Hinges to Keep It in Place

The nail heads or screw heads should be filed off or cut off after being placed in position.

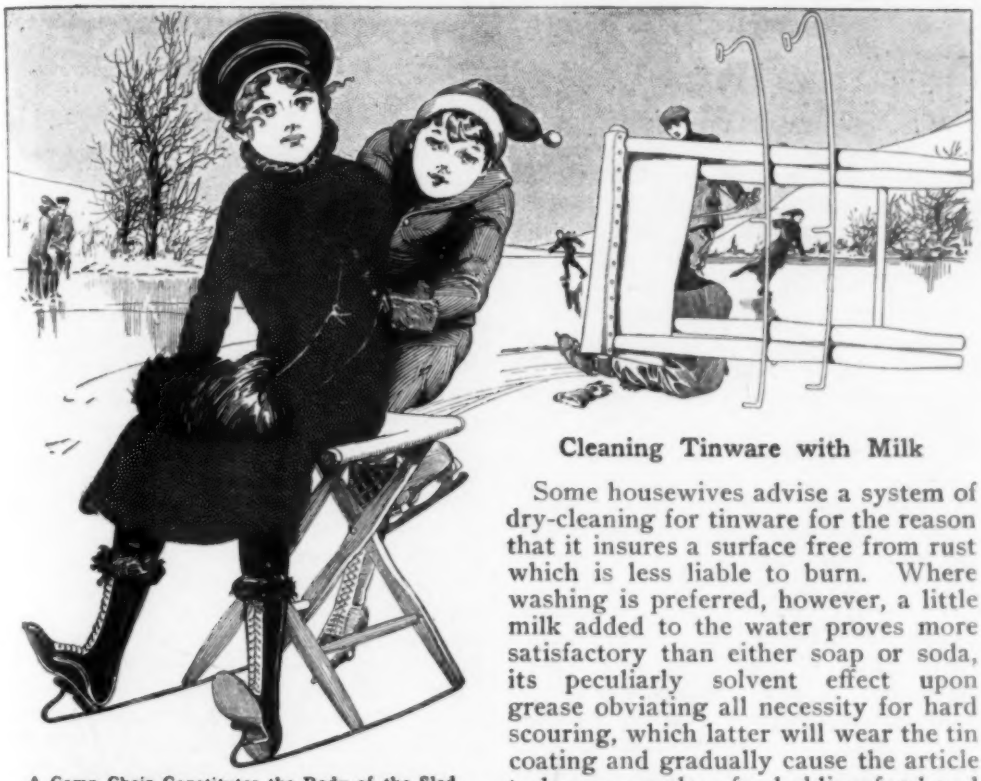
¶All metal patterns should be thoroughly cleaned with a stiff brush having plenty of beeswax on it and dipped in powdered plumbago. Brush the pattern well, and it will draw easily and make a smooth casting.

Sanitary Holder for Thread and Dental Floss

A simple and convenient method of protecting a spool of thread, or dental floss, from collecting dirt and germs is shown in the illustration. A small glass jar, with a metal screw top, is procured, of such a size that it will easily accommodate the spool of thread desired to protect, with at least ⅛ in. clearance all around the edge of the spool. Procure a short piece of stiff wire, not more than 1/16 in. in diameter, and make a frame similar in form to the one shown. The center portion of this frame should be just a little longer than the spool, so that a small wood key may be placed through the eye formed in the wire and thus hold the spool firmly on the frame. The outside portions of the frame should be such a distance apart that they will rest against the sides of the jar and of such a length that they will reach from the bottom to the top of the jar when the lid is screwed down tightly. If these dimensions are observed, the spool and frame will remain in a fixed position in the jar.

A small opening, just a little larger than the thread, is made in the center of the lid, through which the thread is to pass. The edges of this opening are smoothed off so that they will not cut the thread when it is being drawn out. A small cutter may be made by forming a V-shaped opening in the lid, through which the thread is to pass. The edges of the V-shaped piece are sharpened to serve as a cutting edge. The end of the thread will be held under the V-shaped piece after it is cut, thus preventing it from falling back into the jar.

¶The word "diameter" when applied to gears is always understood to mean the pitch diameter.



A Camp Chair Constitutes the Body of the Sled and the Legs are Equipped with Runners

A Folding Ice Sled

On a smooth ice surface, or on hard snow, the sled shown will run easily, and a skater can push another with surprising speed by a light push on the shoulders while the rider rests his feet on the front of the runners. The sled is light, and it can be folded up and carried under the arm. It is also handy for putting on the skates, or for use in a crowded car.

Any camp stool will do for the main part of the sled. Holes are bored in the ends of the legs to receive the lugs on the runners snugly. If the builder is not equipped with a forge, a blacksmith will make the runners cheaply. The sliding surfaces of the runners are smoothed with a file.—Contributed by Thomas Lappin, Portland, Ore.

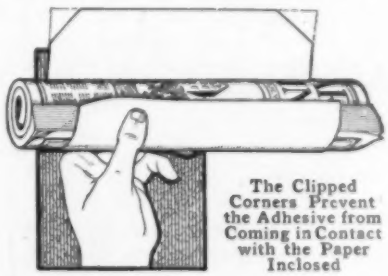
¶A column of water 27.6 in. will have a pressure of 1 lb. per square inch.

Cleaning Tinware with Milk

Some housewives advise a system of dry-cleaning for tinware for the reason that it insures a surface free from rust which is less liable to burn. Where washing is preferred, however, a little milk added to the water proves more satisfactory than either soap or soda, its peculiarly solvent effect upon grease obviating all necessity for hard scouring, which latter will wear the tin coating and gradually cause the article to become useless for holding food and more apt to rust into holes.—Contributed by J. E. Pouliot, Ottawa, Can.

Proper Way to Wrap Papers for Mailing

In using a homemade paper wrapper for mailing purposes cut a triangular section from each end of it before applying the paste or mucilage. This prevents the adhesive from oozing out



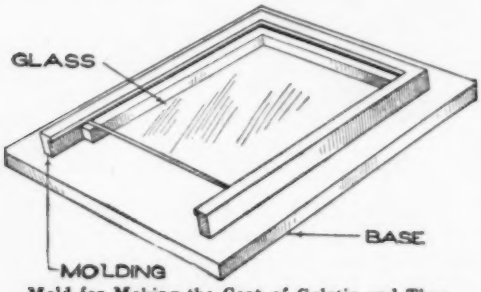
The Clipped Corners Prevent the Adhesive from Coming in Contact with the Paper Inclosed

at the edges and sticking to the paper it incloses. This also permits the easy withdrawal of the paper.

How to Make Photo Sculptures

By CHARLES I. REID

The making of photo-sculpture reliefs in plaster of Paris is something that the average amateur photographer seldom attempts, although the process is quite simple, and there is a novelty to the thing that makes the effort worth while. The only special apparatus required is a sheet of glass of the same size as the negative to be reproduced, and a wood frame to hold the glass in a horizontal position and provide an edge around it, to hold the emulsion which is to be coated on the glass. The frame is made of molding, attached to a baseboard, with one end left loose for making it easy to insert and remove the piece of glass.



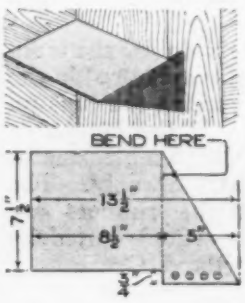
Mold for Making the Cast of Gelatin and Then the Final Plaster Cast

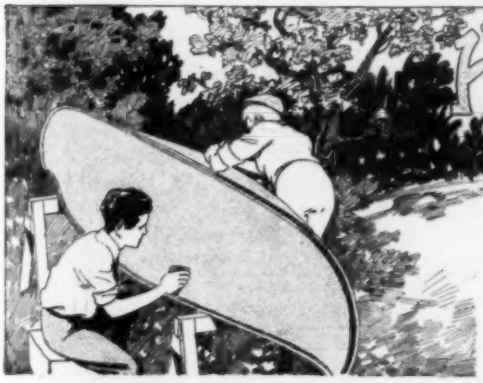
The chemical part of the operation consists in dissolving ½ oz. of potassium bichromate in 10 oz. of water. Some ordinary gelatin is soaked in cold water until it is soft. The cold water is then poured off and hot water, equal in volume to the gelatin used, is added, which will turn it into a thick, viscous mass. A sufficient amount of bichromate solution is added to the gelatin to color it a decided orange, and the whole mixed thoroughly. Enough of the gelatin is poured on the glass in the frame to cover it to a depth of about ⅛ in. The frame is set on a level place in a dark room until the gelatin is hardened, which will take several hours, according to the temperature of the room. The sheet of hardened gelatin is then removed from the frame and glass and placed on the negative to be reproduced. The two are held in contact in a printing frame and exposed to the sunlight in the same manner as when making a print on printing-out paper, until the image is plainly visible on the gelatin.

The sheet of printed gelatin is then placed in a tray of cold water where it will begin to swell, the exposed parts having been rendered insoluble in printing, and vice versa. The water is changed from time to time until the gelatin no longer tinges it yellow, when the gelatin is removed from the bath and carefully blotted. The image will then stand out in relief clearly. After it has hardened a little, the surface of the relief is coated with sweet oil, to prevent it from sticking to the final cast. Mix some plaster of Paris with water to form a thick solution. The gelatin relief is surrounded with a wall of putty, or dough, to form a retainer for the liquid plaster, which is now poured into the mold, using a sufficient amount to make the cast ¼ in. thick. After the plaster has hardened, the gelatin is removed, and the plaster relief is complete. Every detail of the negative is recorded in relief on the plaster cast with a soft, smooth effect.

A One-Piece Bracket

Where looks are not to be considered, the one-piece bracket shown in the illustration makes a simple device for supporting a shelf, or the like. It is made of a single piece of sheet iron of a thickness to hold what is desired, cut and bent to the shape shown. If made of material thick enough, it makes an excellent support for an electric fan.





How To Build A Canoe

By Stillman Taylor

PART I

Specifications and List of Materials

CANOE making is commonly considered more difficult than building the larger and heavier craft but many amateurs with only ordinary experience and tools have turned out satisfactory canoes, and if the simple directions given here are carefully followed out, the work will proceed rapidly and no difficulty will be encountered. Working with light materials, the canoe builder must pay particular attention to the workmanship, and, as it is many times more difficult to patch up mistakes in a canoe than it is in rowboats or other heavier craft, the work must not be hurried, but plenty of time taken to do each and every part well and in a workmanlike manner.

The craft described, which is the regulation open or Canadian model, is comparatively light and draws very little water. It is not a flimsy makeshift, but a stiff and thoroughly dependable canoe designed for long service, which, barring accidents and given reasonably good care, will continue to give satisfaction for many years. The tools needed are the common ones found in most homes, consisting of a rip and cross-cut saw, chisel, screwdriver, drawknife, awl, brace and bits, rule, hammer, vise, plane, and three or four cheap wood, or metal, screw clamps. The list of material given is for a canoe having a length of about 16 ft., 31-in. beam, 18-in. depth at the ends, 12½-in. depth amidships, and weighing from 60 to 70 lb., according to the material.

While oak or ash makes the best stems, other woods may be used, rock elm and fir being very satisfactory substitutes. Where cedar is specified, spruce pine, cypress, or fir may likewise be employed. The materials for molds and ribbands, which are required

STEM, 1 piece oak or ash, 6 ft. long and ¾ in. square.
KEELSON, (inside keel) 1 piece oak or ash, 14 ft. long, 3½ in. wide, ⅝ in. thick.
GUNWALES, 2 pieces oak or ash, 16 ft. long, ⅞ in. wide, ½ in. thick.
SEAT RISINGS, 2 pieces oak or ash, ½ in. square.
FENDERWALES, 34 ft. ½-in., half-round molding. Oak or ash best for hard knocks.
OUTSIDE KEEL (may be omitted if desired), 1 piece oak, 14 ft. by 1 in. by ½ in. thick.
DECK BEAMS, 2 pieces oak or ash, 8 in. long, 1¼ in. wide, ⅝ in. thick.
SEAT FRAMES, 2 pieces oak or ash, 30 in. long, 3 in. wide, ¾ in. thick.
SEAT FRAMES, 2 pieces oak or ash, 12 in. long, 2¼ in. wide, ¾ in. thick.
PLANKING, cedar or pine, 100 sq. ft., ⅛ in. thick. Best secured by purchasing 25 ft. of 1-in. lumber, and having same dressed on two sides to ⅛ in. thick, and in lengths of 12, 14, and 16 ft. This will give the minimum amount of waste.
BACKBONE, 1 piece cedar or pine, any cheap stuff, 16 ft. long, 4 in. wide, ⅞ in. thick.
MOLDS, 1 piece any cheap stuff, 16 ft. long, 1 ft. wide, ⅞ in. thick.
RIBBANDS, 8 pieces any cheap stuff, 14 ft. long, ¾ in. wide, ½ in. thick.
RIBS, 300 running feet, cedar, 1¾ in. wide, ⅛ in. thick.
BREAST HOOKS OR DECKS, 1 piece cedar or oak, 32 in. long, 9 in. wide, ¾ in. thick.
1 lb. 2-in. wire nails to make form for keel.
1 lb. ⅝-in. copper clout nails, for fastening ribs.
½ lb. ¾-in. copper clout nails, for fastening seat risings.
18 1¼-in. No. 8 brass screws, for fastening decks and deck beams.
24 1-in. No. 6 brass screws, for fastening seats.
4 lb. patent marine glue to cement canvas to planking.
3 oz. No. 2 ounce copper tacks to fasten canvas with.
11¾ yd. No. 6 ounce canvas for covering hull.
1 lb. ⅝-in. copper tacks to fasten planking to ribs.

to give form to the craft, may be cut from any cheap stuff, and this will reduce the cost somewhat.

The Backbone and Molds

The first step in the construction of a canoe is to get out the backbone and the molds, or forms, which give the correct dimensions and shape of the craft. The backbone may be made from any inexpensive soft wood, such as cedar, spruce, pine, or cypress; and for making it a piece of lumber, 16 ft. long, 4 in. wide, and 7/8 in. thick, is used. By referring to Fig. 1 it will be seen that the upper edge measures exactly 15 ft. 8¾ in., and that the lower edge is ½ in. longer, giving a total length of 15 ft. 9¼ in. The spaces numbered from each end of the backbone toward the center, as 1, 2, 3, and 4, indicate where the corresponding molds are to be placed. Seven molds are used and as a canoe is tapered alike at both ends the molds are numbered alike and are made exactly to the same dimensions.

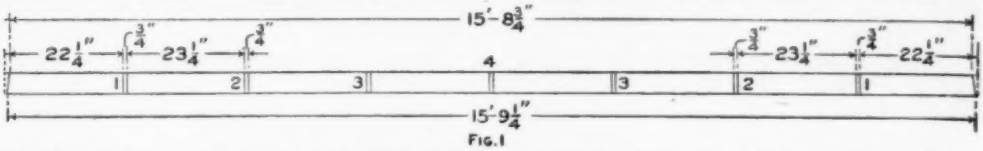


FIG. 1

The First Step in the Construction of a Canoe Is to Get Out the Backbone and the Molds, or Forms, Which Give the Correct Dimensions and Shape of the Craft

A good way to lay out the backbone accurately is first to mark the total length, making the lower edge 1 in. longer than represented in Fig. 1, then measure along the top edge exactly 22¼ in., and run a pencil line across. From this line measure off ¾ in. and draw a second line across the width of the board parallel with the first. This space represents the thickness of the mold, and it is marked 1. Measure off 23¼ in. and make two parallel lines as before and number it 2, measure another 23¼-in. length and number it 3. Begin measuring from the opposite end of the board as in the first instance, 22¼ in. and give it number 1, then mark off 2 and 3 the same as for the end already marked. The board is then cut off at the bevel mark at each end.

The Molds or Forms

The molds which give the form to the hull are shown and numbered in the order that they are fastened to the backbone. To get out No. 1 mold draw a rectangle on a sheet of stiff paper exactly 13⅝ in. long and 11 in. wide as shown in Fig. 2. Run cross lines to divide it in quarters and mark out the center mortise for the backbone, which is 5 in. deep and ⅞ in. wide. Measure 4 in. toward each side from the outside edge of the backbone mortise and mark the mortises for receiving the gunwales, which are 1⅝ in. long and ¾ in. wide or deep. To obtain the correct bilge curve lay the rule on the bottom line and measure off exactly 1 in. to the left of the center dividing line and make dot 0. Measure 2¾ in. farther to the left, to A; turn the rule at right angles and measure 2⅛ in. inside the line and make dot 1. Measure 1½ in. to the left of A, turn rule at right angles and measure up the sheet exactly 4⅞ in. and make dot 2, which will be ¼ in. inside of the left vertical line. On the center horizontal line, which is 1 15/16 in. above dot 2, mark dot 3, 1/16 in. from the left vertical line. Measure off 2 in. above the horizontal center line and make dot 4 on the vertical line. The space between these two dots is the widest part of the bilge curve. Lay the rule on the bottom line of the gunwale mortise and measure off 3/16 in. from the outside line and make dot 5. Pencil the angle from dot to dot and draw in the full curve. Cut out the half section, fold on the vertical center line, and draw the right side.

Two complete No. 2 molds are required, but it is more convenient to make each mold in two sections. Each half is made 11½ in. wide and 12 in. deep, as shown in Fig. 3. First draw a rectangle to these dimensions and

run cross lines to divide it into quarters. Beginning at the upper right-hand corner, mark the mortises for gunwales and backbone, which, being only one-half of the complete form, will be 7/16 in. wide and 3¼ in. deep. Laying the rule on the outside line immediately below the mortise, draw a second mortise for the keel, which is ⅜ in. deep and 1½ in. wide in the half section. Measure off 1¾ in. to the left along the bottom line from keel mortise and make dot 1. The dot 2 is made by measuring 2½ in. to the left of 1, turning the rule at right angles at B and measuring 5/16 in. inside the line as shown in the sketch. Make the dot 3 at a point 1¾ in. to the left of 2 and ¾ in. inside of the line. The dot 4 is 1¾ in. from C and 1¾ in. inside of the line. The dot 5 is 1¼ in. farther to the left and 3¼ in. inside of the line. The dot 6 is ⅝ in. from dot 5 and 4¾ in. inside of the line, which will bring it ⅜ in. inside of the left vertical line. At a point 1½ in. above 6 make dot 7 on the marginal line, and dot 8, 1¼ in. above it. Between the dots 7 and 8 is the widest part of the bilge curve. Dot 9 is exactly ¼ in. inside of the vertical marginal line. These dots produce the angles, and it is only necessary to trace in the full curve and cut it out to make a pattern for the other three half sections needed.

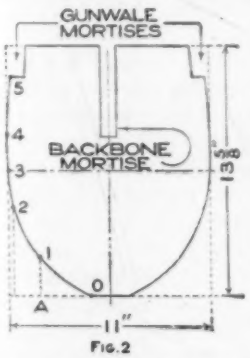


Fig. 2

The molds No. 3, Fig. 4, are located near the center of the canoe and are made a trifle wider. Make a rectangle 14⅜ in. long by 12 in. wide and draw cross line dividing it into quarters. Trace the half mortises for the backbone, gunwale, and keel from the No. 2 mold pattern. Lay the rule on the bottom line and measure off ½ in. to the left from the center vertical line and mark dot 1, which is the beginning of the bilge curve. At a point 2¾ in. to the left and ¾ in. inside of the line place dot 2, and 2 in. to the left of this and 2¼ in. inside of the line place dot 3, then 1⅛ in. farther to the left turn

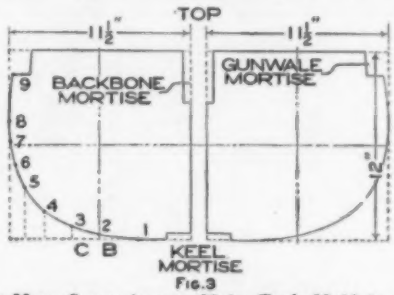


Fig. 3

It Is More Convenient to Make Each Mold in Two Sections, as Two Complete Molds are Required

the rule at right angles and measure up 4 in. inside of the line for dot 4, which is 13/16 in. inside of the left marginal line. At a point 2 in. above dot 4 make dot 5 on the marginal line and 2⅛ in. above it make dot 6. The space between gives the widest part of the bilge curve, with dot 7 exactly ¼ in. inside of the marginal line, measuring along the bottom of the gunwale mortise. Trace the angle and from it run the full curve and use this for a pattern for cutting out the other molds.

Mold No. 4 is placed amidships in the center of the canoe and only one complete mold is required, as shown in Fig. 5. To make a pattern draw a rectangle 15 in. long and 12 in. wide, and divide it into four equal parts as before. From the No. 3 mold pattern trace in the mortises for the gunwale, backbone, and keel. Lay the rule on the bottom outside line and measure

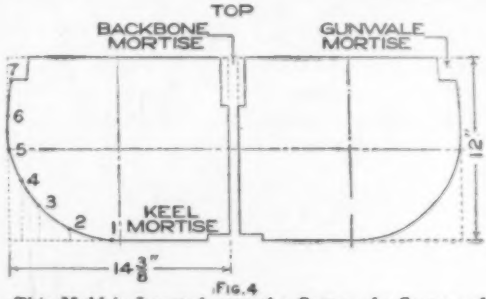


Fig. 4

This Mold is Located near the Center of a Canoe and is Made a Trifle Wider

2 in. from the center line to the left at D and turn the rule at right angles and

measure off 5/16 in. inside of the bottom line and make dot 1. Measure, from D, 1½ in. to E, turn the rule up and measure off ⅝ in. inside the line and make dot 2. The dot 3 is 1½ in. farther to the left and 1¼ in. inside the line and dot 4 is 1 in. to the left of 3 and 2 in. inside of the line. The dot 5 is 1¼ in. to the left of dot 4, and 4 in. inside of the bottom line, which will bring it ¼ in. inside of the left vertical side line. At a point 2 in. above dot 5 make dot 6 on the outside vertical line and 1¼ in. above it make dot 7. The space between dots 6 and 7 gives the widest part of the correct bilge curve. Exactly 3¾ in. above dot 7 and ¼ in. inside of the vertical side line make dot 8, which marks the beginning of the bilge curve above the water line and at the gunwale mortise. The curve of the canoe floor is quite flat, but not exactly a straight line. Lay the rule on the bottom line and measure up, on the inner edge of the keel mortise, ⅛ in., then 2½ in. to the left make a mark, F, 1/16 in. inside the bottom line and a pencil line drawn between them will enable one to trace the correct curve.

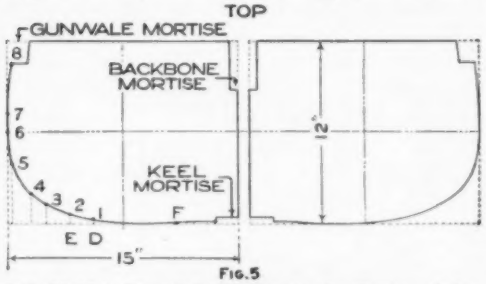


FIG. 5

This Mold is Placed Amidships, in the Center of the Canoe, and Only One is Required

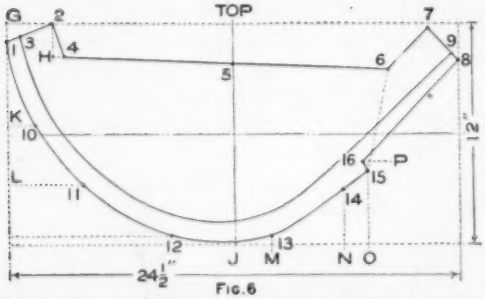


FIG. 6

Straight-Grained Material must be Selected for the Stems, as It Is Necessary to Bend Them to Shape

Having cut out the pattern make two wood forms exactly alike to have it complete, as shown. After finishing the seven complete molds, fasten them securely together by nailing a couple of battens across the halves.

The Ribbands and Stems

The ribbands are merely strips of wood, ¾ in. wide, ½ in. thick, and 14 ft. long. Any cheap stuff will do because they are only used to give the correct shape of the canoe curve while building it. Six ribbands are necessary, and it is best to use eight lengths in order to make sure that the ribs are bent at the required angle and that both sides of the canoe are ribbed at the one uniform curve. For the stems ash or oak, ¾ in. square, is used, and straight-grained material must be selected since it is necessary to bend them to obtain the requisite curve.

To make the pattern for the stem mold, shown in Fig. 6, draw a rectangle, 24½ in. long by 12 in. wide, and divide it into four equal parts. Lay the rule on the left side at the upper corner, at G, measure down 1 in. and make dot 1. Lay the rule along the top horizontal line and measure 2½ in. from G and make dot 2, then draw a pencil line between them. From dot 1 measure along this line exactly ¾ in., and make dot 3. From dot 2 measure straight down 1¾ in. to H, turn at right angles and measure off ⅝ in. to the right and make dot 4, and make a pencil line from 2 to 4 as shown. From dot 2 lay the rule parallel with the top horizontal line and measure off 9¾ in., turn at right angles and measure down on the center line 2¼ in. and make dot 5.

Lay the rule at the upper right corner and measure down the vertical line 2¾ in., turn the rule at right angles and measure off 3⅞ in. and make dot 6. From the upper right-hand corner measure off 1⅝ in. and make dot 7 exactly ¼ in. inside the top horizontal line. Again place the rule at the right-hand corner, measure down the vertical line exactly 2 in. and make dot 8. Draw the line from dot 7 to 8, and ½ in. from dot 8, make dot 9. This gives

the correct contour of the stem where it joins the splice of the keel.

The greatest curve and width of the amidships. It is unnecessary to go to the trouble of making a paper pattern for this because the keel is merely ta-

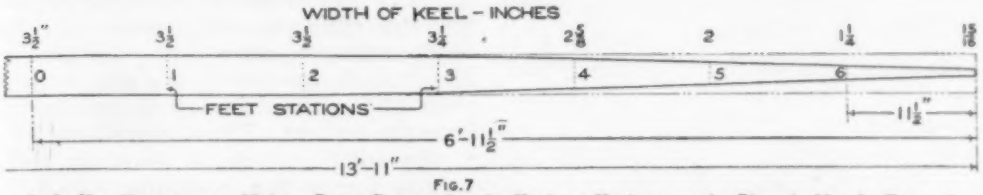


FIG. 7

It Is Not Necessary to Make a Paper Pattern for the Keel, or Keelson, as the Piece is Merely Tapered Uniformly from Center to Ends, and It can be Drawn Direct on the Board

stem is at J on the lower line. To obtain the correct curve begin at the upper left corner and measure from dot 1 down the vertical line 4½ in. to K, turn the rule at right angles and measure 1¼ in. inside the line, and make dot 10. The dot 11 is placed by measuring down from K exactly 3¼ in. to L, when the rule is turned at right angles and a length of 4 in. measured off inside of the line. The dot 12 is located in the same manner by measuring 2¾ in. below L and running 8¾ in. inside the line, as shown.

To finish the irregular curve of the stem, measure from J at the center of the lower horizontal line 2 in. to M, turn the rule up and measure off ½ in. inside of the line, and make dot 13. The dot 14 is made by measuring off 4 in. from M to N and turning the rule to a point 3 in. inside the line, as shown. Then from point N measure to O 1¼ in., and then measure up 4 in. to dot 15. From the dot 14 to 15 run a straight line. The dot 15 should be exactly 5 in. inside of the right vertical line.

Allowance for the beveled splice of the stem to the inside keel must now be made, and the beginning is to run a light pencil line from dot 15 to dot 6. From dot 15 measure up ½ in., turn the rule at P and make dot 16 exactly ¼ in. to the left of the upright line. From dot 16 a line is run to dot 8 which completes the angle of the curve. The full curve is then easily traced in.

The Inside Keel, or Keelson

The inside keel, or keelson, is made exactly 13 ft. 11 in. long and 3½ in. wide in the center, which is, of course, pered uniformly from center to ends, and this may be drawn on the surface of the board direct. The board being 13 ft. 11 in. long and 3½ in. wide, it is only necessary to make cross lines exactly in the center both ways. From the center measure 1 ft. toward one end and make the width at that point 3½ in. Measure 1 ft. farther along, and again make the width 3½ in. as before. Continue in this manner, making the third station 3¼ in.; the fourth, 2⅝ in.; the fifth, 2 in.; the sixth, 1¼ in., and the width at the ends 15/16 in. This detail is well shown in Fig. 7. Bend the stem on the mold and fasten it to the keel by means of a couple of ¾-in. No. 10 screws at each end.

The Ribs and Gunwales

The ribs are best made of cedar, cut from the same material as the planking. They are 1¾ in. wide and ⅛ in.

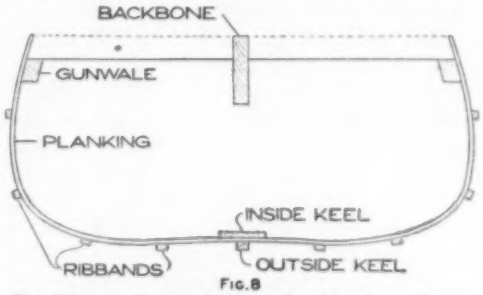


FIG. 8

The Ribs are Fastened to the Outside of the Keelson and are Curved under the Ribbands

thick. It is a good plan to saw out several long lengths and cut them off as required, the length being determined by measuring from gunwale to gunwale around the curve over the ribbands. The ribs are put in under the

ribbands, and the thickness of the latter will allow sufficient wood for making a good fit at the sheer line. The

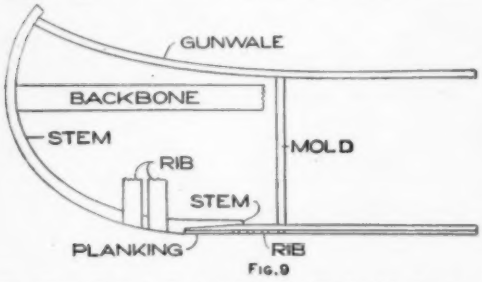


FIG. 9

The Bent Stem is Fastened to the Keel with Screws at Both Ends

gunwales are two straight strips, 16 ft. long, ⅞ in. wide, and ½ in. thick.

Setting Up the Canoe

Having made all the material ready, the work of setting up the canoe may begin, and as it is built upside down, place the backbone on boxes, about 1 ft. or more above the floor, and place the molds in the numbered places on the backbone, allowing the backbone to rest upon the bottom of the mortises cut in the top of the molds. Study Figs. 8 and 9 before beginning the work of setting up the hull.

True up the molds with a square and fasten them firmly by toenailing them to the backbone. Put the keelson in place, allowing it to fit down in the mortises cut in the molds to receive it. Take particular care that the stems are a good fit with the angle of the backbone at the ends, then fasten by nailing through the top edge of the mold into the stems. As shown in the stem-mold drawing, Fig. 6, the splice where the stem fits the keelson must be cut out after it is bent into place. This is easily done by marking around the outside edge of the stem and then beveling from the inside on each side. The outer edge is left about ⅛ in. wide, and the bevel runs out to the width of the keel at the lower end.

The gunwales are next put on at the sheer line, and fastened to the molds and stems, leaving sufficient of the nails exposed to make them easily withdrawn later on. The four ribbands are then put on each side, at equal distances apart, between the gunwale and keel, or at 5-in. centers, measuring from the keel up toward the gunwale. Fasten the ribbands by driving 1¼-in. brads through them into the mold. Measure off the keel for the ribs, which should be put on 3 in. apart, measuring from the centers. The ribs are fastened to the outside of the keelson and are curved under the ribbands. Fasten each rib to the keel by means of two ⅝-in. copper clout nails, then spring them into place and fasten to the gunwales. Put in all the ribs in the same way, spacing them so that a rib will be placed over each mold. When all the ribs are put in, remove the ribbands, and begin planking the hull.

Planking the Canoe

As a canoe is planked with ⅛-in. cedar it is easily bent to the curve of the ribs while cold, thus doing away with the trouble of steaming. Unlike heavier-planked craft the planking is not rabbeted at the stem but is nailed to the beveled surface. For strength and to give a perfectly smooth skin on which to lay the canvas, it is advisable to run the planking the full length from stem to stem. Begin by putting on the garboard strake, which is the bottom plank at the keel. Punch holes in the plank with an awl, not directly in line, but staggered from side to side along the ribs. This will prevent the possibility of splitting. Drive in the copper clout nails while the plank is kept in place with a clamp to facilitate

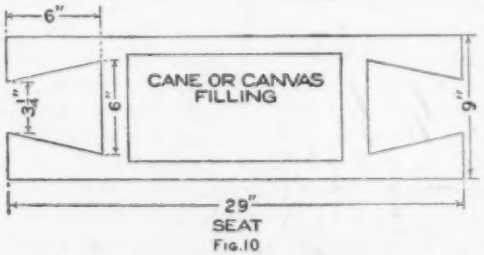


FIG. 10

The Seat Frame may be Caned, or a Canvas Seat Tacked On, as Preferred

the work. Hold a clinch iron, or any handy piece of iron, inside and clinch the nails so that the ends are well im-

bedded in the rib on the inside. It is a simple matter to fit each plank in place, because they are merely a close fit at the edge, butted together without beveling. The number of planks required will depend upon the width, and while wider strips may be used, planking cut to the width of 3 in. is generally employed. In any case the top plank or sheer strake should be level with the gunwale from one stem to the other. When the hull is completely planked, cut off the ends of the planking to the curve of the stems and gunwales. The backbone and molds may now be taken out by sawing the backbone in two. Tack a couple of strips across the gunwales to keep the hull from sagging out of shape, then drive the nails over the sections the molds occupied, since these forms prevented doing this work before.

Seat Risings and Seats

The seat risings are simply straight sticks, ½ in. square, and are fastened on the inside for the seats to rest upon. They are about 4 in. below the gunwale. Oak or ash is the best material, and the length is 14 ft. To fasten in place, first bore a small hole and then nail through the planking and ribs, and clinch on the inside of the rising.

The seat frame is fashioned as shown in Fig. 10, and may be caned, or a canvas seat tacked on, as preferred. Many canoeists prefer to kneel, in which case a seat bar, about 4 or 5 in. wide, is run athwartships for the paddler's back and thighs to rest against while paddling.

The Deck Beams and Decks

The deck beams are merely straight pieces, about 8 in. long, 1⅛ in. wide, and ⅜ in. thick. These are notched at the ends as shown in Fig. 11, so that they will come up and wedge against the sides of the gunwales about ½ in. Put them in by boring a hole through the gunwale and fasten with a 1¼-in. No. 10 screw at each end. Two are required, one at each end.

The deck, or breast, hooks are made 16 in. long by 8 in. wide and of the shape shown in Fig. 12. To fasten them in place bore three holes through the deck into the deck beam and secure them with three 1¼-in. No. 10 screws. Bore three holes along the gunwale on each side and turn three 1¼-in. No. 10 screws into the deck.

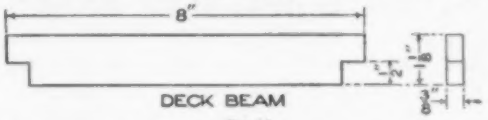


Fig. 11

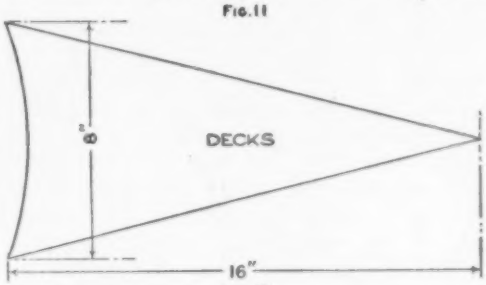


Fig. 12

The Shape of the Deck or Breast Hooks and the Beams That Support Them

A Center Thwart

To strengthen and stiffen the hull a center thwart, or cross bar, should be run across the canoe amidships. A piece of oak or ash, ⅜ in. thick and tapering from 2 in. in the center to 1 in. at the ends, should be screwed to the lower side of the gunwale. Although not exactly essential, it is a good plan to run another thwart across the canoe just back of the forward seat, and a rear thwart some 3 ft. forward of the rear seat, or paddling bar. This will make the craft very stiff when a heavy load is carried, and likewise prevent the lightly constructed hull from sagging, or "hogging," when stored for the winter.

Fig. 13

The Manner of Shaping the Ends of the Canvas to Fit over the Canoe Ends

Applying the Canvas

The canvas is put on with marine glue, the black kind being the best for

this particular purpose. Before gluing the canvas, lay it smoothly on the hull and trim so that it will fold nicely at the stems, as shown in Fig. 13. Melt the glue in a can over a moderately hot fire and spread it on one side of the canvas with a stiff brush. Of course, the glue will be too thick to spread evenly, but be sure to apply it as evenly as possible, and touch every bit of the canvas with a fairly heavy coating of glue. Lay the glued canvas in place, and iron with a moderately hot flatiron. This melts the glue, and the canvas will adhere smoothly to the planking. Finish by tacking the edge of the canvas along the edge of the gunwales, and fold the canvas as smoothly as possible at the stem, and tack in place, running the line of tacks exactly down the center line of the stem.

Fenders or Covering Strips

Fenders of ½-in. round molding may be tacked on to cover the edge of the canvas, or a strip, 1 in. wide, may be sawed from the same material as the planking and tacked to cover the edge by using 1¼-in. brads every 2 or 3 in. along the edge.

Stem Bands and Outside Keel

The stem bands may be made from wood if desired and bent to shape, but the brass oval stem or bang iron, ⅜ in. wide, makes a stronger and better finish. The wood stem band should be about ⅜ in. square, and rounded on the outside. Put this on with 1¼-in. brads and fasten the brass band with ¾-in. screws.

The outside keel may or may not be used, according to preference. It strengthens the canoe to a certain extent and keeps the bottom from many a scratch while pulling out. The usual outside keel is about 1 in. wide and ½ in. thick, of oak or ash, and tapered at the stems to the width of the stem bands, which are screwed on over it. The most serviceable keel is about 2½ in. wide in the center, and tapers to fit the bands at either end. When made of ⅜-in. oak, or ash, it makes a splendid protection for the bottom of the hull, especially when the craft is used in rocky waters. Unlike the narrow keel, the flat keel makes the canoe easier to turn with the paddle, but any form of keel will add several pounds to the weight of the craft and is for this reason often omitted.

Painting the Canoe

The canvas should be given a coat of shellac before the paint is applied. This makes it waterproof. Then four coats of paint are applied to fill the fibers of the canvas. To make a smooth finishing coat, rub down the second and third coats with fine sandpaper. The entire woodwork of the canoe should be finished with three coats of good-quality outside spar varnish.

A slatted grating, made of soft-pine lattice stuff, about 1⅛ in. wide and 1¼ in. thick, will afford protection to the bottom of the canoe. For summer use this is desirable, but may be omitted on long trips and when soft footwear is worn. The grating should not be fastened to the ribs, but the parallel strips screwed, or nailed, to cross strips, curved to fit the contour of the canoe's bottom. The grating should extend from well under the stern seat up to the stem splice in the bow, and should be nicely tapered to make a neat appearance. By fastening two or three little blocks of wood so that they will extend up between the slats, one may screw small brass buttons into these blocks to keep the slatted floor in place, thus making it easily removable when washing out the canoe.

A Ring-and-Egg Trick

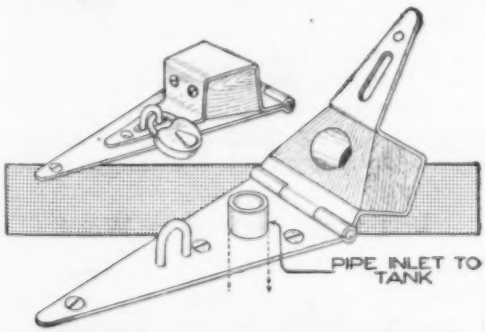
This trick consists in borrowing a ring and wrapping it in a handkerchief from which it is made to disappear, to be found in an egg, taken from a number in a plate.

Obtain a wedding ring and sew it into one corner of a handkerchief. After borrowing a ring, pretend to wrap it in the center of the handkerchief, but instead wrap up the one concealed in the corner, retaining the borrowed one in the hand. Before

beginning the performance, place in the bottom of an egg cup a small quantity of soft wax. When getting the cup, slip the borrowed ring into the wax in an upright position. An egg is then chosen by anyone in the audience. This is placed in the egg cup, the ring in the bottom being pressed into the shell. With a button hook break the top of the shell and fish out the ring. The handkerchief is then shaken out to show that the ring has vanished.

Lock for Gasoline Tank on a Launch

Having trouble by thefts of gasoline from the tank in my launch, I made the following device to prevent them, which proved very effective. A strap hinge, about 12 in. long, was procured, and on one wing, near the outer end, I fastened a staple made of a large nail, and near the center a large hole was drilled to fit over the pipe, or opening, to the tank. The other wing of the hinge was bent to the shape shown, and an oak block was fastened in the bend with wood screws. A hole was bored in the block to fit over the end of the pipe. A slot was cut in the same wing at the end to receive the staple. In turning the wing over to cover the pipe end, the staple was brought into position for a padlock. After locking the device, most of the screws are cov-

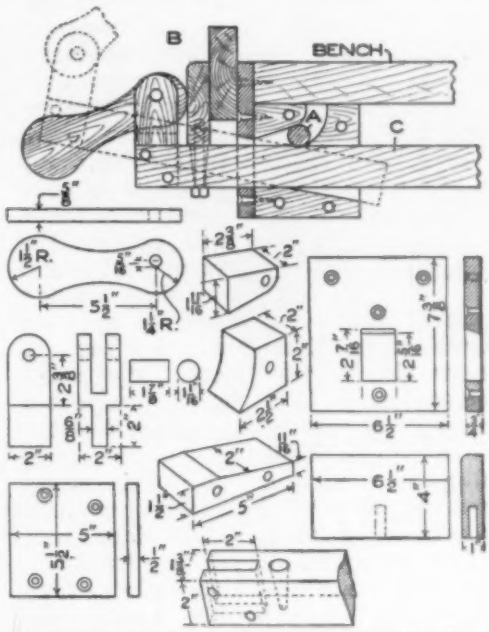


Filler-Pipe Cover Lock to Prevent the Theft of Gasoline from a Motorboat

ered so that it is almost impossible to remove them without taking off the lock. — Contributed by Stephen H. Freeman, Klamath Falls, Oregon.

A Quick-Acting Bench Vise

For those who desire a quick-acting vise and cannot afford the price of a manufactured one, I designed the vise



A Quick-Acting Vise Made of Hard Wood for the Home Worker's Bench

shown in the illustration. A detail is given of each part, with dimensions, so that it is not difficult to make it from hard wood. The roll A binds the vise so that it remains rigid, while the cam in front gives the necessary play, to release or tighten as preferred. The clamp jaw B is pivoted so that it swings loose, thus making it fit any surface that may not be parallel with its opposite side. In releasing the stock, the cam is first turned, and then the front part of the vise is pulled up to relieve the roll A. The front jaw can be then moved back and forth to take stock of any size desired. As soon as the stock is placed, the roll A falls into place and clamps the jaw arm C.— Contributed by J. C. Hansen, Maywood, Ill.

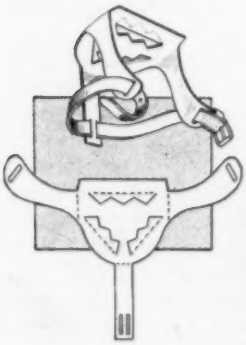
¶A practical vacuum will raise water 30 feet.

An Emergency Dark-Room Light

The traveling man who "lives in a suitcase" and at the same time wishes to enjoy the pleasures of amateur photography sometimes experiences difficulty in developing films in a hotel room. Soup plates borrowed from the steward, or even the bowl pitcher and the ice-water pitcher in the room, can be used for development, but it is very hard to improvise a ruby lamp. My emergency lamp is a small vest-pocket flash lamp over which two yellow envelopes, one inside of the other, are slipped, as shown. The lower edges are cut perfectly square and rest on the table, or shelf, in the closet, and all white light is excluded. At night, the shades may be drawn, and a yellow-paper sack may be tied around the electric light.—Contributed by J. L. Pinkston, Granite Hill, Ga.

An Ice Creeper

The illustration shows a one-piece ice creeper for the heel of a boot or shoe. It is made from sheet steel with the arms bent up to receive a strap for buckling it in place on the boot heel. The zigzag cuts in the bottom part are turned down for engaging the ice. —Contributed by Chas. S. Snell, Lewiston, Me.



¶In machine work a way must be provided for removing dowel pins before they are driven in place.

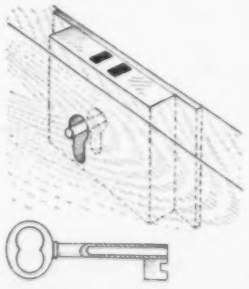
Waterproofing for Fish Lines

Dissolve ½ oz. of orange shellac in ½ pt. of alcohol, and add 1 teaspoonful of Venice turpentine, the same quantity of raw linseed oil, and 2 oz. tincture of benzoin. Shake well, and set in a varnish can in hot water.

Soak the coiled line in the varnish for two hours, then hang it up to dry. Thin the varnish with alcohol, and repeat the dipping. When the line is dry, rub it down well with a wool rag greased with tallow. Silk lines treated in this manner are pliable, and the fibers of the silk are so united by the varnish that the strength of the line is almost doubled.

Making Chest Lock More Secure

As a rule, ordinary chest locks cannot be relied upon, since almost any kind of a similar key will unlock them. I found a good remedy by taking out the pin on which the key fits, and making a new one twice as long as the one removed, then drilling a hole in the key deep enough to fit over the new pin. In case the pin extends too far, a piece of wood block, with a hole in it to admit the key, can be fastened over it to prevent bending the pin. No ordinary key will pass on the pin far enough to turn the lock.—Contributed by Chas. G. England, Washington, Pa.



Driving Screws in Hard Wood

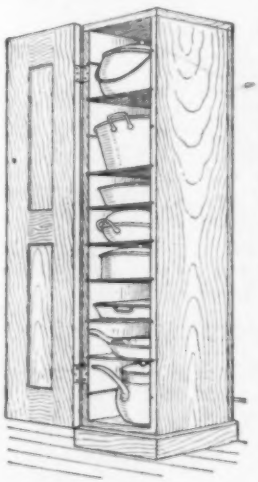
Keep the supply of screws in a box containing a small amount of powdered soapstone. Shake the box occasionally, and the screws will be dusted with the powder, which acts as a lubricant. This is a much cleaner and more convenient method than the ordinary one of rubbing each screw on a bar of soap before driving it in hard wood.

How to Make a Good Putty

To make a good putty the following formula should be used: Mix equal parts of firmly ground whiting and white lead with enough linseed oil to make a thick liquid; add enough commercial putty to this to make the consistency of regular putty. This putty will not crack or crumble, and it costs very little to make. If desired, the commercial putty may be left out and enough whiting added to take up the liquid. The life of this putty is four times greater than a commercial putty. —Contributed by L. E. Fetter, Portsmouth, N. H.

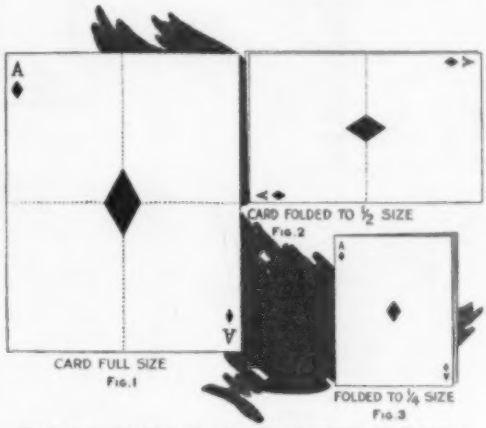
Cupboard for Kitchen Utensils

The illustration shows a style of a cupboard in which kitchen utensils can be kept in an orderly manner without taking up a great deal of space. The cupboard is tall and narrow, and the interior face of each side is scored at even intervals with saw cuts, ¼ in. deep. In the grooves are placed shelves, which are merely squares of galvanized iron. By placing the shelf in the proper grooves the space is adapted to the size of the utensil. The small floor space occupied allows the cupboard to be placed in the part of the kitchen that is most convenient.



A Diminishing Card Trick

A clever diminishing card trick may be played with a piece of paper made up as shown in the illustration. Show the audience the whole card, Fig. 1, then fold it halfway and show again, Fig. 2, then again, Fig. 3. If this is done quickly it will not be noticed. A piece of paper is used the size of a regular playing card, and an ace is made on one side. When it is folded over, one side of the reduced size is made to

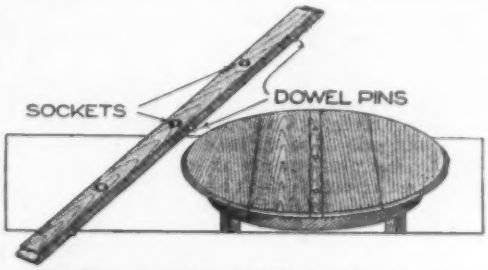


Reducing the Size of a Playing Card While Holding It in One Hand

show the same ace, then another fold is made and the smaller ace is made.—Contributed by Louis Waherer, Tiffin, Ohio.

Table Sockets for Electrical Heating Apparatus

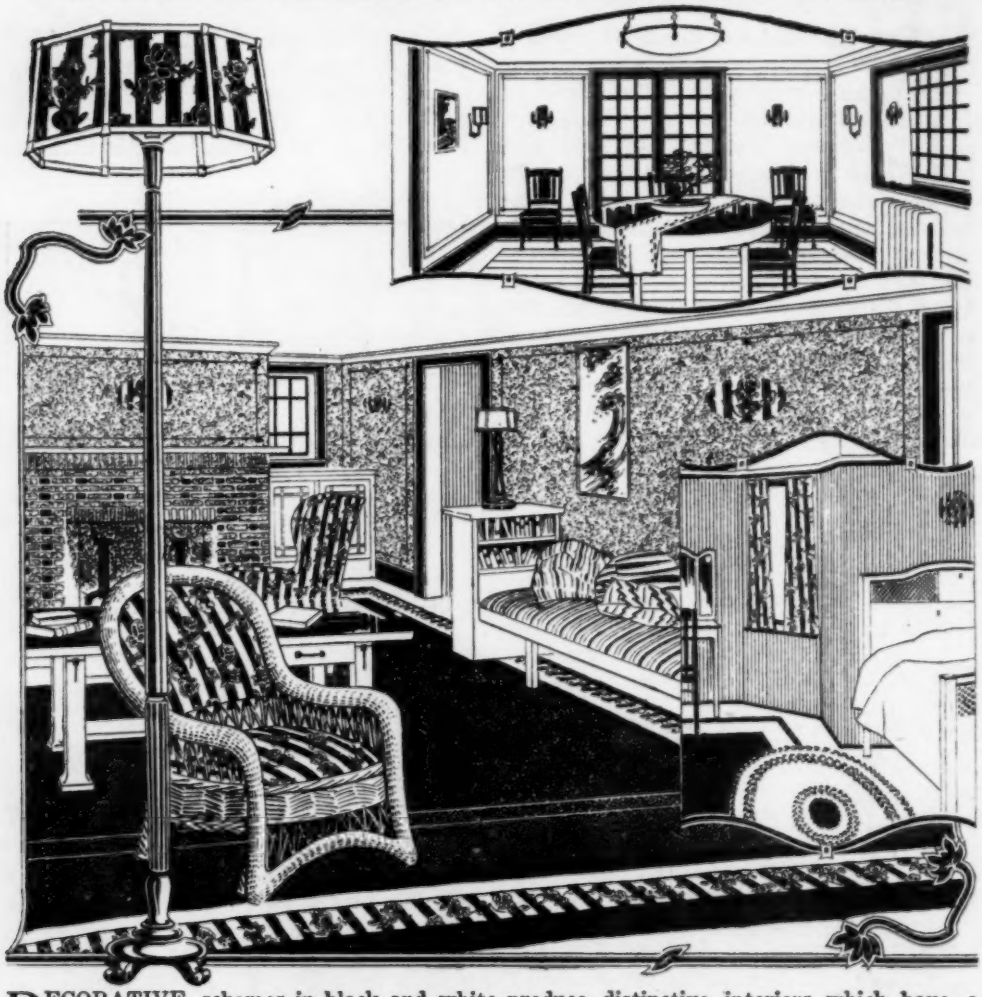
The usual method of running a wire from a chandelier or wall bracket to a heating device on the dining-room table is inconvenient as well as unsightly. This I overcome by making a special narrow leaf to put in the extension top into which sockets are set flush for



The Extra and Narrow Table Leaf Carries the Electric Sockets for the Cooking Apparatus

extension wires. These are connected to a floor socket, or a line can be run under the carpet or rug.—Contributed by Maurice Baudier, New Orleans, La.

EFFECTIVE INTERIORS IN BLACK AND WHITE



DECORATIVE schemes in black and white produce distinctive interiors which have a peculiar appeal, especially to those who admire the modern trend in this art. The drawing above illustrates one way of carrying out the scheme. Here black and white is the predominating note, the complete absence of color on the one hand and the presence of all color on the other producing a sharp contrast which is relieved by the use of orange, grays, and dark reds. The design used on the walls throughout gets its motif from the fabric used as an upholstering material for the chairs, and also as a covering for the floor lamp, the post of which is finished in black and white. The floral part of this design is worked out in a deep orange. It will be observed that this pattern is also used as a border for the low-toned rug in the living room, and for the hangings in the bedchamber, and elsewhere to an extent, although not pictured. The walls of the living room are mottled in grays and black and given a panel effect. No pictures are used, two pen-and-ink sketches of a conventional order alone being placed on opposite sides of the room. The upholstering of the seat continues the black and white scheme, while the pillow coverings are deep-colored. A white table with an ebony top, and black woodwork margined with white, complete the room. Light-gray paneled walls, a dark-topped table that blends with the gray used on the walls, and black chairs, are used in the dining room. The walls of the bedchamber are covered with a narrow-striped, black and white paper. On the floor a black rug with a white border is used.

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